

USER INSTRUCTIONS

MODEL MCE325 PROGRAMMABLE USER STATION



RTS™

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DESCRIPTION & SPECIFICATIONS

Description

General

The MCE325 is a four-channel, programmable intercom station. It may be used as a headset station or, with the addition of the MCS325 Modular Speaker, as a speaker station. It may be mounted in a console or equipment rack via optional mounting kits.

The MCE325 can be used with either two-wire or four-wire intercom lines, or a combination of both. In this manual and in the labeling on the MCE325, references to channels 1, 2, 3, and 4 indicate two-wire lines; references to four-wire A and four-wire B indicate four-wire lines.

The MCE325 can be interfaced to a variety of external devices including external program sources, two-way radios, paging systems, and satellite circuits. Some typical applications are shown in Figure 1.2 through Figure 1.10.

Features

Features of the MCE325 include:

- **Call Signaling:** Call signaling is accomplished using an inaudible (20 kHz) signal to activate a call indicator LED.
- **Remote “talk-off”:** Active, unattended remote station microphones may be deactivated by momentarily injecting an inaudible (24 kHz) signal into the corresponding intercom line. The MCE325 can send and receive “talk-off” signals.
- **VOX circuit:** The MCE325 may be programmed for voice activation of the microphone.
- **Simple IFB:** Program audio assigned to a channel is interrupted during talk.
- **External device keying:** External devices, such as two-way radios, speaker mute relays, or paging systems may be activated through key outputs at the auxiliary connector on the rear panel. The key outputs may also be used to expand the simple IFB function, allowing any one of a number of MCE325 stations to interrupt the program source and talk on the line.
- **Microphone limiter:** The microphone preamplifier circuit contains a limiter, which helps to equalize voice levels.
- **Fully programmable:** Retains programming even when power is shut off.

Front Panel Features

Channel Selector and Operation Buttons

These buttons have two modes of operation: standard operating mode and program, or setup, mode. The printing on the face of each button indicates its function in standard operating mode; printing under each button indicates its setup mode function. (See Section 3 for operation and programming instructions.) An LED located above each button provides status information.

The MCE325 is factory pre-programmed for two-channel operation, with each channel having one talk and one listen button. However, the MCE325 may also be programmed so that each channel selector button controls both talk and listen for a single channel, permitting operation of up to four intercom channels. Additionally, users may wish to customize the identification of channels. With this in mind, a button kit has been supplied with the MCE325 to allow you to customize the button labeling to suit your particular application. Figure 1.11 shows the available button caps as well as some typical button configurations.

NOTE The standard buttons are opaque. As a result, the front panel LED's may not be visible when viewing the MCE325 from a low angle (such as when it is mounted high in an equipment rack). As a remedy for this problem, clear buttons are available that allow the LED light to pass through. (Order RTS™ part no. 9000-2698-800)

Volume Controls

CH1 (VOL 1): This control adjusts the volume of channels 1 and/or 3 to the left headphone when stereo headphones are used. It adjusts the mono mix level of these channels when monaural headphones or an external speaker is used.

CH2 (VOL 2): This control adjusts the volume of channels 2 and/or 4 to the right headphone when stereo headphones are used. It adjusts the mono mix level of these channels when monaural headphones or an external speaker is used.

PGM VOL: This control adjusts the mono mix of program A and program B (input at the rear panel and assigned via internal programming) to the headphones and external speaker.

Sidetone Nulling Trimmers

These trimmers are adjusted to prevent acoustic feedback when using a panel microphone along with an external speaker.

Connections, Inputs and Outputs

Front Panel

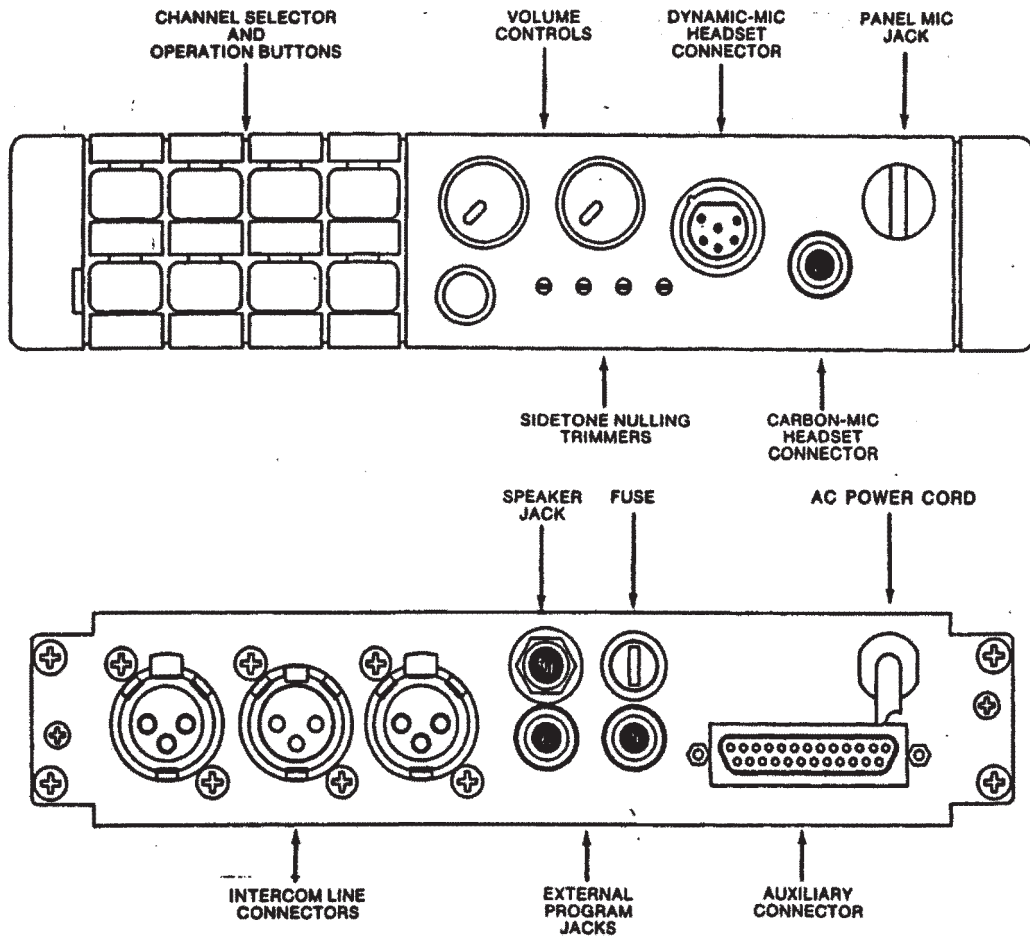
DYNAMIC MIC HEADSET: This connector accepts a stereo-earphone, dynamic-microphone headset (with or without a mic on/off switch).

CARBON MIC HEADSET: This connector accepts a standard 3-conductor, ¼-inch phone plug. The necessary phantom power is provided to power a carbon microphone or its electronic equivalent.

Panel Microphone Jack

The MCE325 may be optionally fitted with a gooseneck panel microphone by removing the blanking plug located in the upper-right corner of the front panel. The panel microphone jack accepts specially made gooseneck microphones (MCP-90 series), which are available from RTS.

Figure 1.1 MCE325 front and rear panel features.



Rear Panel Features

Intercom Lines

Connectors J8 and J9 are parallel-wired for loop-through connection to additional stations. These connectors are used either for two-wire channels 1 and 2 input/output, or four-wire channel A output. (The four-wire channel A input is connected at the auxiliary connector.)

Connector J10 is used for two-wire channel 3 and 4 input/output, or four-wire channel B output, but no loop-through connector is provided for these channels. (The four-wire channel B input is connected at the auxiliary connector.)

The MCE325 presents a bridging impedance of 10,000 ohms to the intercom line, and is designed for use with intercom lines having a 200-ohm line terminating impedance. A 200 ohm termination plug is supplied (connected to J10) to prevent channels three and four from oscillating when the MCE325 is in two-channel mode.

External Program Input

Two 1/4-inch phone jacks are provided for external program input. The station accepts line-level, balanced input. The two program inputs are mixed internally, and may be assigned (through internal programming) to right headphone, left headphone, external speaker, or any combination of these. In addition, program A may be assigned (through internal programming) to two-wire channel 3 or four-wire channel A; program B may be assigned to two-wire channel 4, but cannot

be assigned to a four-wire channel. The program assigned to channels is interrupted during talk output.

Speaker Output

A ¼-inch phone jack is provided for connection of an external speaker (8-ohms minimum impedance). The speaker output is compatible with the MCS325 speaker.

Auxiliary Connector

Standard Options on the 25-pin, female, D-Sub connector are:

- 1 Unswitched microphone output
- 2 ISO connection to a VCP6A/VCP12A/VCP12B
- 3 Microphone on/off switch
- 4 Remote headset
- 5 Remote panel microphone
- 6 Separate inputs for +10 to +15 volts DC, and +17 to +24 volts DC
- 7 Common/ground circuit
- 8 Four-wire channel A and B inputs
- 9 Remote speaker mute
- 10 Key outputs

Programming

Three methods of programming are used:

- 1 Front panel programming via the channel selector and operation buttons.
- 2 Internal programming via circuit board DIP switches.
- 3 Internal programming via circuit board jumpers.

The most commonly programmed options are assigned to the front panel for convenience. Detailed information on internal programming is provided in Section 2, Installation. Detailed information on front panel programming is provided in Section 3, Operation.

Power

The MCE325 is designed for local powering, and is supplied ready for use with either 115 or 230 VAC (but not both). The unit may also be powered from an external DC source connected at the Auxiliary (J22) connector on the rear panel. For information on changing the AC supply voltage configuration, or using DC power, see Section 2.

Mounting Configuration

Mounting configurations are illustrated in Figure 2.3 and include rack mount speaker station, console mount headset station, rack mount headset station, desk top headset station, and portable speaker station. Some mounting configurations may require a remotely located microphone or headset. These may be connected to the Auxiliary connector (J22) on the back of the unit.

MCE325 Specifications

General

Bridging Impedance (to line)	10,000 ohms typical
Noise Contribution to 200-ohm Line	-90 dBu
Call Signal Frequency	20 kHz, crystal controlled
Talk-off Frequency	24 kHz, crystal controlled

Microphone Preamplifier

Maximum Voltage Gain	54 dB
Frequency Response	100 Hz to 8,000 Hz, ± 3 dB
Input Impedance	1,000 ohms
Limiter Range	30 dB

Headphone Amplifier

Maximum Voltage Gain	30 dB
Frequency Response	100 Hz to 8,000 Hz, ± 3 dB
Headphone Impedance	50 to 600 ohms
Output Power	150 mW into 50 ohms
Output Voltage Level	8 Vp-p

Speaker Amplifier

Maximum Voltage Gain	30 dB
Frequency Response	100 Hz to 8,000 Hz, ± 3 dB
Speaker Impedance	8 to 16 ohms
Output Power per Amplifier	5W into 8 ohms
Output Voltage Level	16 Vp-p

Power and Mechanical

Power Requirements	115 to 230 VAC, 20 VA max, 12 to 25 VDC, 100 to 125 mA quiescent, 900 mA max
Dimensions	1.72" H x 8.2" W x 8" D (44 mm x 208 mm x 203 mm)
Weight	4.25 lbs (1.93kg)
Material/Finish finish	Thermo-plastic front panel, aluminum case, light gray

Connectors

Intercom Line Connector	XLR type, 3-pin (male-female loop through on two-wire channel 1 and 2, or four-wire channel A; Female only on two-wire channel 3 and 4, or four-wire channel B)
Dynamic Mic	XLR type, 6-pin female
Carbon Mic	¼-inch phone jack, 3-circuit
Auxiliary Connector	25-pin, female, D-Sub
Program Inputs	¼-inch phone jack, 3-circuit
Speaker Output	¼-inch phone jack, 3-circuit
Panel Mic	¼-inch phone jack, metal busing, 3-circuit

MCS325 Specifications

The MCS325 is designed for use with MCE325, but may also be used as a general-purpose monitor for program material.

Impedance	8 ohms (DCR5.5 to 7 ohms)
Power Rating	5W RMS continuous
Sensitivity	90 dB \pm 2 dB/2.83 volts/one meter on axis averaged over one octave bands centered at 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, and 8 kHz when enclosed in a sealed box of 1.3 liters volume.
Frequency Response	200 Hz to 10 kHz \pm 4 dB on 1/10 octave measurement in 1.3 liter sealed box.
Free Air Resonance	200 Hz to 250 Hz
Distortion	Less than 10% @ 5W at resonance.
Stray Magnetic Field	Less than 1 gauss at 1 cm from chassis.
Mechanical Noise	Unit to be free of buzzes and rattles at 5 W sine wave input from 100 Hz to 10 kHz.

Figure 1.2 Standard two-channel, two-wire configuration.

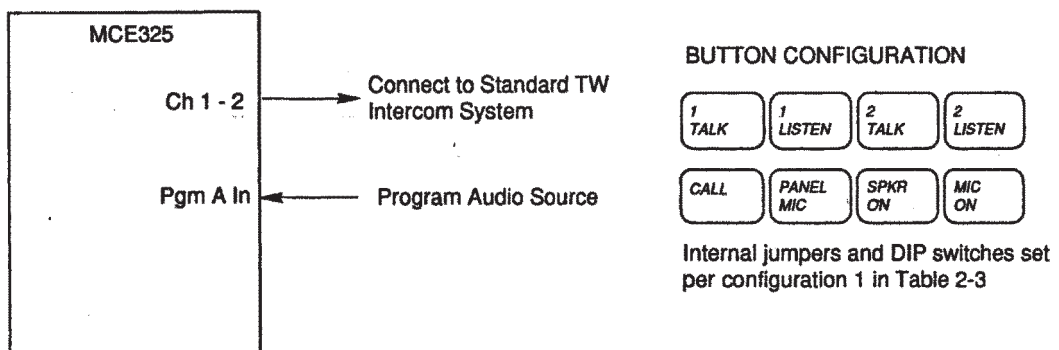


Figure 1.3 Standard four-channel, two-wire configuration.

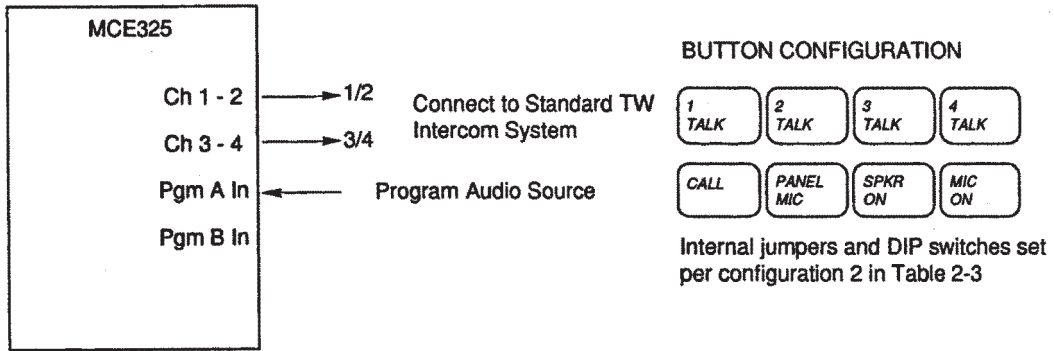


Figure 1.4 A four-channel, two-wire configuration with two channels used for IFB's.

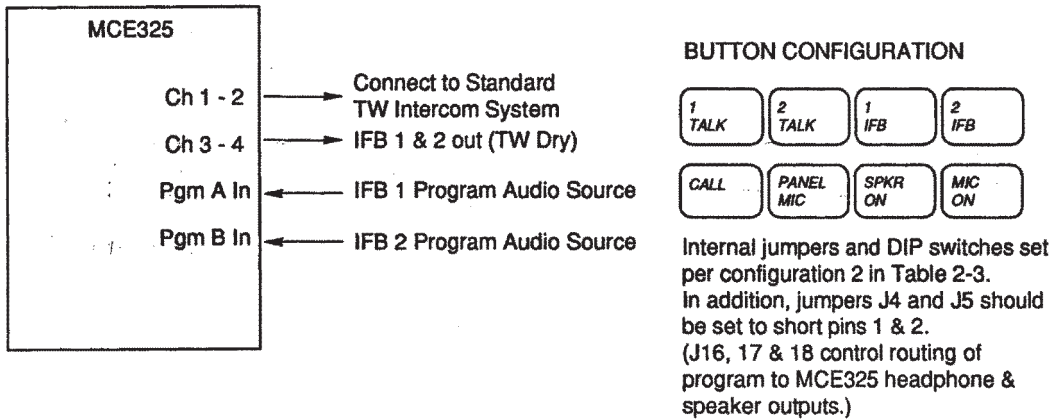


Figure 1.5 Configuration for one or two two-wire channels and one four-wire channel.

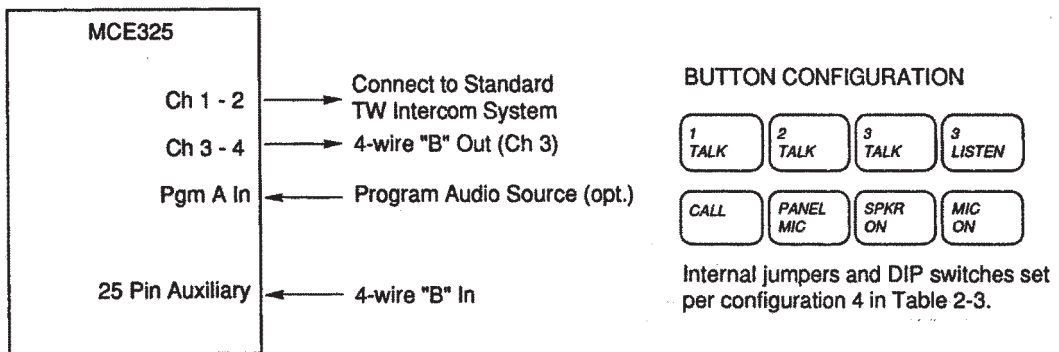


Figure 1.6 Standard two-channel, four wire configuration.

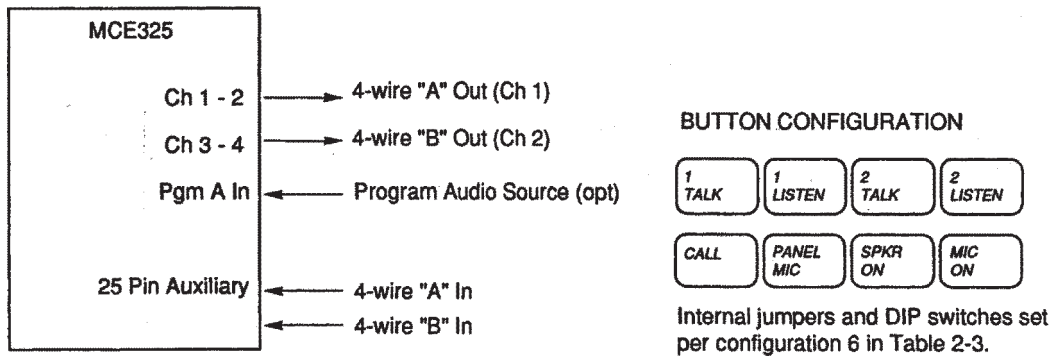


Figure 1.7 Multiple interconnected stations in four-channel, two-wire configuration with two channels used for IFB's.

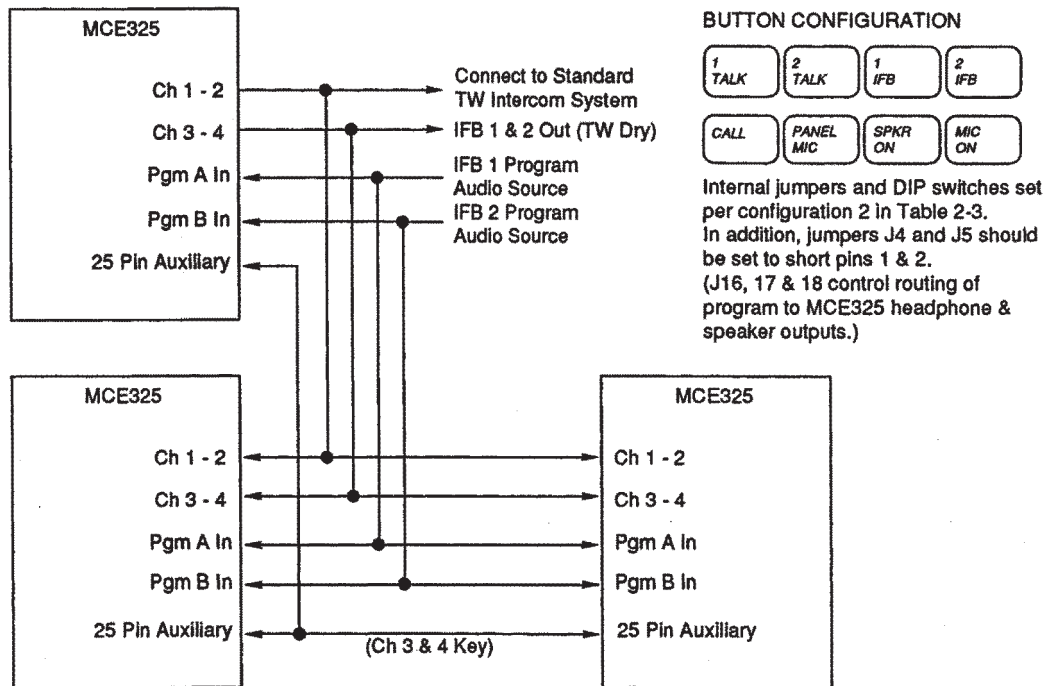


Figure 1.8 Multiple interconnected stations using one four-wire intercom channel and two two-wire channels for IFB's.

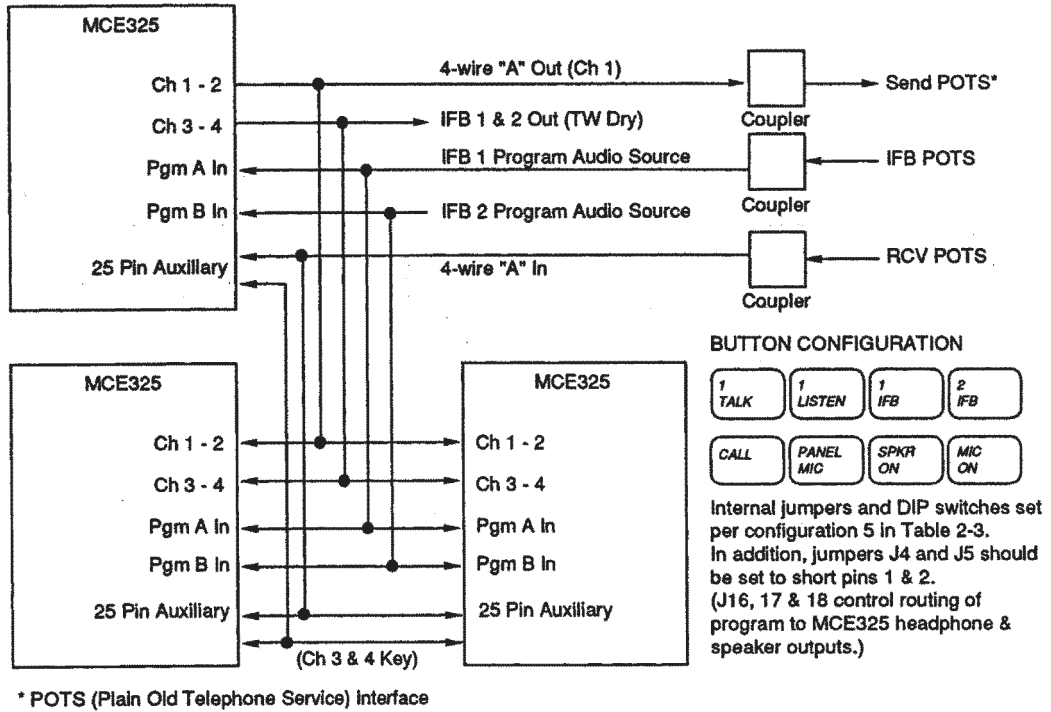


Figure 1.9 A four-channel, two-wire configuration with two channels used for IFB's (shown with TELCO interface).

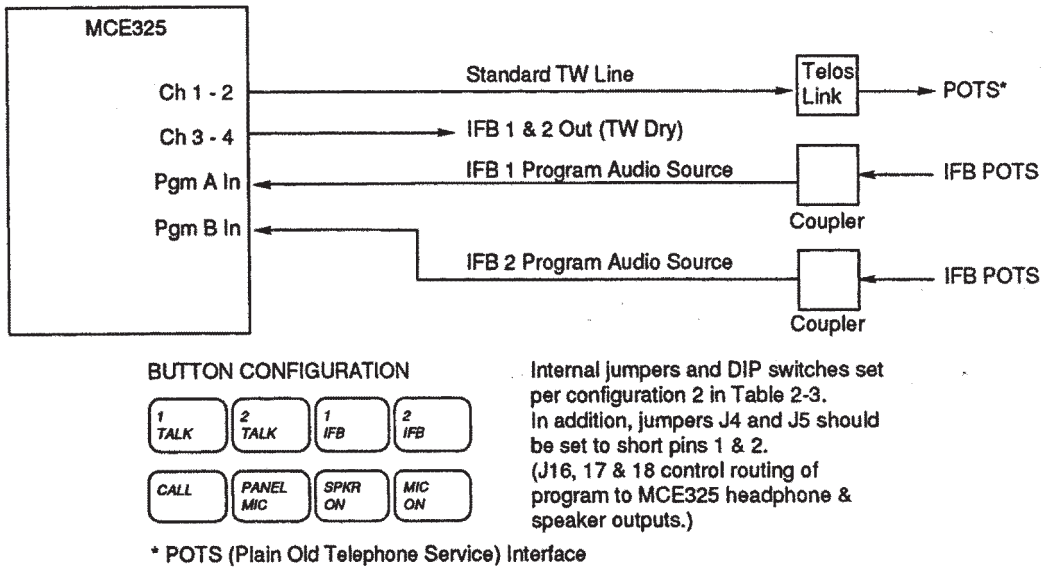
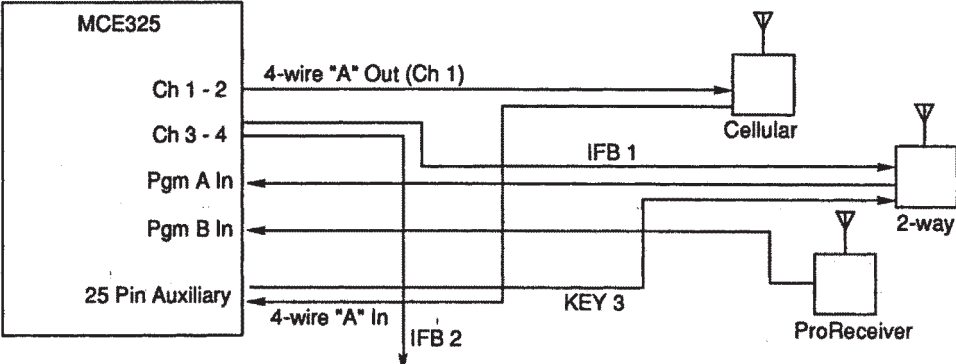
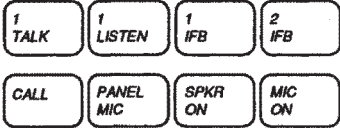


Figure 1.10 Configuration for an ENG truck using one four-wire intercom channel and two two-wire IFB's.



BUTTON CONFIGURATION

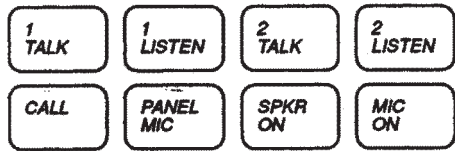


Internal jumpers and DIP switches set per configuration 5 in Table 2-3. In addition, jumpers J4 and J5 should be set to short pins 1 & 2. (J16, 17 & 18 control routing of program to MCE325 headphone & speaker outputs.)

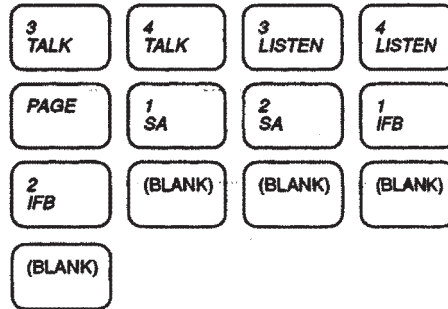
Figure 1.11 MCE325 button configurations.

————— **BUTTONS SUPPLIED WITH THE MCE325** —————

Button Legends Standard on the MCE325

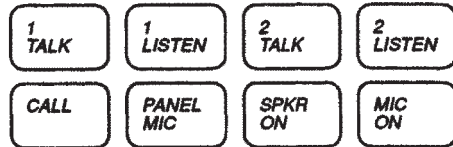


Additional Buttons for Optional Configurations

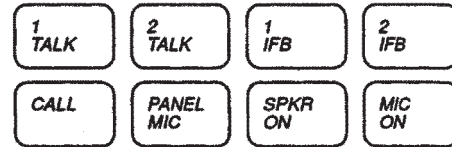


————— **SOME TYPICAL FRONT PANEL BUTTON CONFIGURATIONS** —————

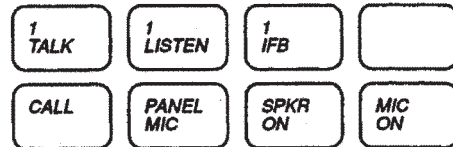
2-Channel Mode, Standard 2-Wire or 4-Wire



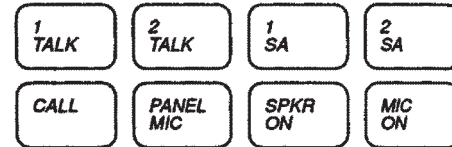
4-Channel Mode, Alternate Version #1



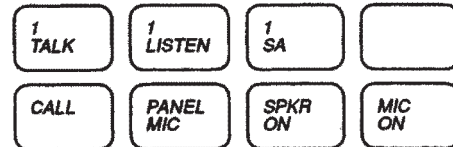
2-Channel Mode, Alternate Version #1



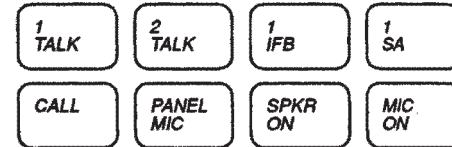
4-Channel Mode, Alternate Version #2



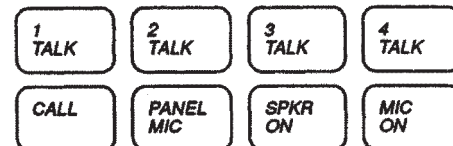
2-Channel Mode, Alternate Version #2



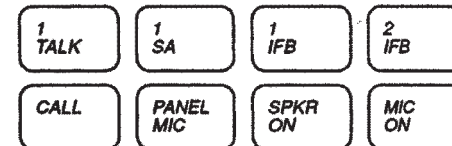
4-Channel Mode, Alternate Version #3



4-Channel Mode, Standard



4-Channel Mode, Alternate Version #4



INSTALLATION

Internal Programming and Adjustments

WARNING

Hazardous voltages exist inside this equipment. Disconnect the AC line cord before opening the equipment or attempting any internal programming or adjusting.

General

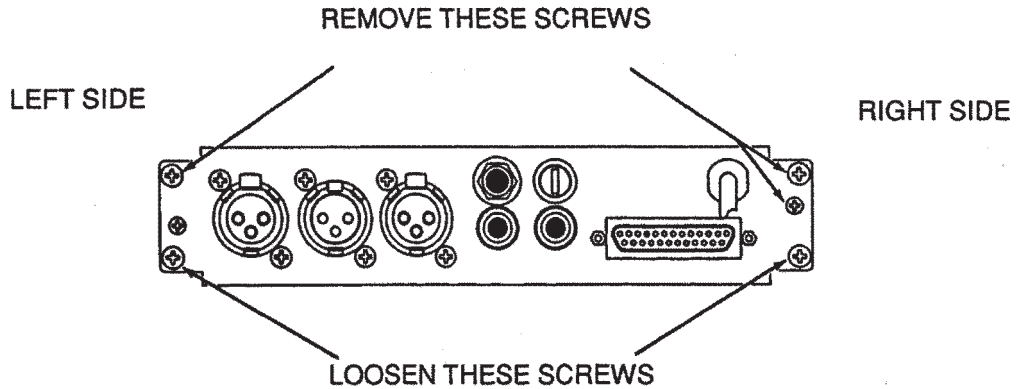
Prior to installing the MCE325, it may be necessary to change some of the internal programming to suit your particular application. Table 2.1 and Table 2.2 list the functions for the DIP switches and jumpers which are used for internal programming. Also shown are the default settings that were pre-programmed at the factory.

If your application requires settings that are different from the defaults, you will have to remove the top cover of the unit (see Figure 2.1) and make the required changes. If you do change the internal programming, it may be useful to note the changes for future reference.

The locations of the DIP switches and jumpers are illustrated in Figure 2.2. DIP switch programming is accomplished by setting switches to the “off” or “on” positions. Jumper programming is accomplished using shorting jumpers. By inserting the jumpers to short the appropriate pins, a function is either assigned or not assigned. Pin 1 of each jumper is indicated by a square symbol in Figure 2.2 for reference when making changes. Also shown in Figure 2.2 are trimmers for adjusting the sidetone and speaker dimming levels. Usage of the DIP switches, jumpers, and level trimmers is described in the following paragraphs.

Figure 2.1 Top cover removal.

WARNING: DISCONNECT AC POWER BEFORE OPENING UNIT.



LIFT LEFT SIDE OF TOP COVER, AND SLIDE THE RIGHT SIDE BACK FAR ENOUGH TO CLEAR TAB ON FRONT PANEL BEFORE LIFTING UP.

Intercom Line-Channel Configurations (DS1-DS3, J6, J7, J19 & J20)

The four channels of the MCE325 may be assigned to intercom lines in a variety of ways. Channel assignment is determined by the settings of DIP switches DS1 through DS3 and jumpers J6, J7, J19, and J20. There are six possible intercom line configurations. These are listed in Table 2.3 together with the proper DIP switch and jumper settings for each.

Table 2.1 DIP switch functions and default settings.

Switch Number	Switch Function	Default Setting
DS1	four-wire CH A output not installed (off), four-wire CH A output installed (on)	Off
DS2	four-wire CH B output not installed (off), four-wire CH B output installed (on)	Off
DS3	two-channel mode (off)*, four-channel mode (on)	Off
DS4	Front panel setup lock-out disabled (off), Front panel setup lock-out enabled (on)	Off
DS5	Listen and talk muted during ISO (off), Talk only muted during ISO (on)	Off
DS6	Not used	Off
DS7	Talk-off transmit disabled (off), Talk-off transmit enabled (on)	On
DS8	VOX disabled (off), VOX enabled (on)	Off

NOTE The terms “two-channel mode” and “four-channel mode” apply only to two-wire lines. In two-channel mode, each two-wire line uses two channel selector buttons: one for talk and one for listen. In four-channel mode, each two-wire line uses one channel selector button for both talk and listen.

The two-channel mode should be selected under only two circumstances:

- 1 When only one or two two-wire lines are connected to channels one and two only.

2 When a two-wire line is connected to channel one and a four-wire line is connected to channel B.

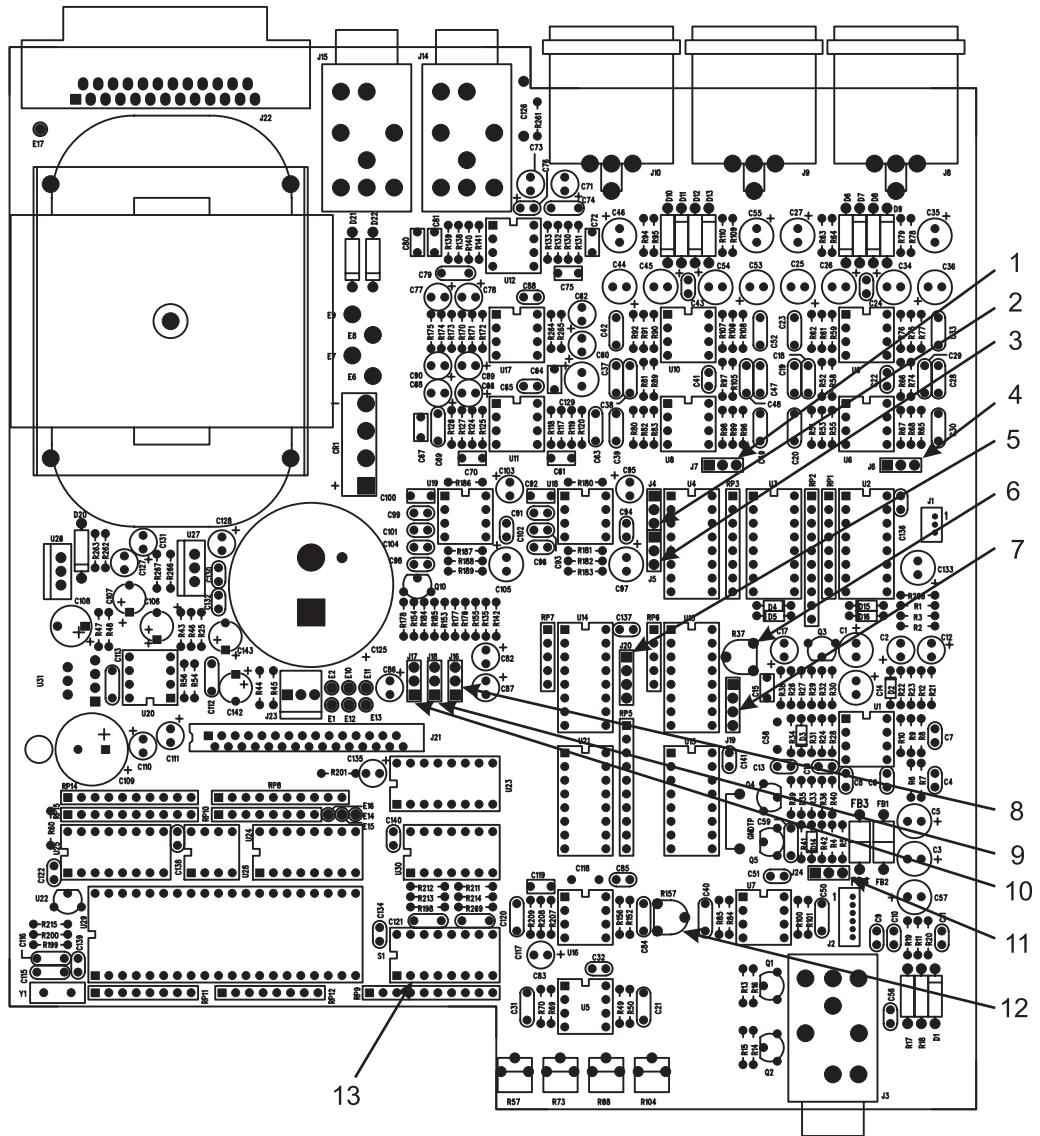
For all other intercom line configurations that use two-wire lines, DS3 must be set to the “on” position for four-channel operation.

Table 2.2 Jumper functions and default settings.

Jumper Number	Jumper Function	Default Setting
J4	Assigns PROGRAM A input to two-wire CH 3 or four-wire CH B. Not assigned: pins 2 & 3 shorted. Assigned: pins 1 & 2 shorted (IFB to CH 3).	Not assigned
J5	Assigns PROGRAM B input to two-wire CH 4. Not assigned: pins 2 & 3 shorted. Assigned: pins 1 & 2 shorted (IFB to CH 4).	Not assigned
J6	Selects two-wire CH1 and CH 2, or four-wire CH A output. (See J19 for CH A input.) CH1 and CH 2 selected: pins 2 & 3 shorted. Four-wire CH A output selected: pins 1 & 2 shorted.	Two-wire operation
J7	Selects two-wire CH 3 and CH 4, or four-wire CH B output. (See J20 for Ch B input.) CH 3 and CH 4 selected: pins 2 & 3 shorted. Four-wire CH B output selected: pins 1 & 2 shorted.	Two-wire operation
J16	Assigns mono mix of the PROGRAM A and B inputs to the left headphone. Not assigned: pins 2 & 3 shorted. Assigned: pins 1 & 2 shorted.	Assigned
J17	Assigns mono mix of the PROGRAM A and B inputs to the right headphone. Not assigned: pins 2 & 3 shorted. Assigned: pins 1 & 2 shorted.	Assigned
J18	Assigns mono mix of the PROGRAM A and B inputs to the speaker. Not assigned: pins 2 & 3 shorted. Assigned: pins 1 & 2 shorted.	Assigned
J19	Selects four-wire CH A input. Off (not used): pins 2 & 3 shorted.* On when LISTEN 1 button is on: pins 1 & 2 shorted. Always on: pins 3 & 4 shorted.	Off
J20	Selects four-wire CH B input. Off (not used): pins 2 & 3 shorted.* On when LISTEN 2 button is on: pins 1 & 2 shorted. Always on: pins 3 & 4 shorted.	Off
J24	Selects unbalanced or balanced dynamic mic input. Unbalanced: pins 2 & 3 shorted. Balanced: pins 1 & 2 shorted.	Unbalanced mic input

NOTE *J19 and J20 jumpers should be in “off” positions when two-wire lines are used.

Figure 2.2 Internal DIP switches, jumpers and level trimmers.



1. J7, Intercom Line-Channel Configurations
2. J4, Program Assignment - IFB Option
3. J5, Program Assignment - IFB Option
4. J6, Intercom Line-Channel Configurations
5. J20, Intercom Line-Channel Configurations
6. R37, Headphone Sidetone Trimmer Adjustment
7. J19, Intercom Line-Channel Configurations
8. J16, Program Assignment - IFB Option
9. J18, Program Assignment - IFB Option
10. J17, Program Assignment - IFB Option
11. J24, Balanced/Unbalanced Dynamic Microphone Selection
12. R157, Speaker Dim Adjustment
13. DS1 Through DS3, Intercom Line-Channel Configurations
13. DS4, Front Panel Setup Mode Lock-out
13. DS5, ISO
13. DS7, Remote Talk-Off
13. DS8, VOX

Table 2.3 Internal programming for the various intercom line configurations.

DIP SWITCHES			JUMPERS			
DS1	DS2	DS3	J6	J7	J19	J20
Configuration 1: Two 2-wire lines (CH 1& CH 2). (Default configuration.)						
Off	Off	Off	Pins 2 & 3 shorted	Pins 2 & 3 shorted	Pins 2 & 3 shorted	Pins 2 & 3 shorted
Configuration 2: Three or four 2-wire lines (CH 1, CH 2, CH 3, CH 4).						
Off	Off	On	Pins 2 & 3 shorted	Pins 2 & 3 shorted	Pins 2 & 3 shorted	Pins 2 & 3 shorted
Configuration 3: One 2-wire line (CH 1); One 4-wire line (CH B).						
Off	On	Off	Pins 2 & 3 shorted	Pins 1 & 2 shorted	Pins 2 & 3 shorted	Pins 1 & 2 shorted
Configuration 4: Two 2-wire lines (CH1 & CH2); One 4-wire line (CH B).						
Off	On	On	Pins 2 & 3 shorted	Pins 1 & 2 shorted	Pins 2 & 3 shorted	Pins 1 & 2 shorted
Configuration 5: Two 2-wire lines (CH 3 & CH4); One 4-wire line (CH A).						
On	Off	On	Pins 1 & 2 shorted	Pins 2 & 3 shorted	Pins 1 & 2 shorted	Pins 2 & 3 shorted
Configuration 6: Two 4-wire lines (CH A & CH B).						
On	On	On	Pins 1 & 2 shorted	Pins 1 & 2 shorted	Pins 1 & 2 shorted	Pins 1 & 2 shorted

NOTE See Table 3.1 for a summary of how the channel selector buttons work for the various configurations. The MCE325 is typically supplied with a termination plug inserted into J10. This plug terminates CH 3 and CH 4 with 200 ohms to prevent oscillation when these channels are not used. When the channels are used, this termination plug should be removed.

Front Panel Setup Mode Lock-out (DS4)

DIP switch DS4 may be set to lock out the front panel programming and prevent changes. Front panel programming is described in Section 3, Operation.

ISO (DS5)

The MCE325 may be used with an RTS Model VCP6A, VCP12A, or VCP12B Control Station to permit private conversation between the MCE325 operator and a camera operator. When ISO mode is engaged, either talk, or talk and listen (depending on the setting of DS5) for all other channels connected to the MCE325 will be muted, and a private line will be established between the MCE325 operator and the camera operator. See “ISO Connection” for wiring information.

Remote Talk-off (DS7)

The MCE325 is capable of generating and transmitting an inaudible, 24 kHz signal on an intercom channel. This signal is used to turn off the microphones on any remote stations on the channel (stations with remote talk-off feature only). This feature is useful when an unattended user station with an activated microphone is introducing unnecessary noise into a line. DIP switch DS7 enables/disables this feature. When remote talk off is enabled, the talk-off signal is activated using the CALL button on the front panel. (for Operation see “Using the Talk-Off Feature”.)

VOX (DS8)

DIP switch DS8 turns the voice activated microphone circuit on or off. Voice activation can be used with the panel microphone, a headset, or a remote microphone connected at the rear panel. (There is no adjustment for VOX sensitivity.)

Program Assignment – IFB Option (J4, J5, J16-J18)

Jumper J4 assigns PROGRAM A to two-wire CH 3 or four-wire CH B with interrupt during talk (IFB A). Jumper J5 assigns PROGRAM B to CH 4 with interrupt during talk (IFB B). (PROGRAM B is not used in four-wire mode.)

Jumpers J16, J17, and J18 assign the mono mix of both program inputs to the left headphone, right headphone, and speaker respectively. Program volume to the headphones and speaker is controlled by the PGM VOL control on the front panel.

See Table 2.2 for Jumper settings. See Figure 2.2 for locations of jumpers.

Balanced/Unbalanced Dynamic Microphone Selection (J24)

The MCE 325 may be used with headsets having either a balanced or unbalanced dynamic microphone. The MCE325 is pre-programmed for use with an unbalanced microphone by shorting J24 pins 2 and 3. For balanced microphones, remove the shorting jumper and reinstall it to short pins 1 and 2.

Headphone Sidetone Trimmer Adjustment (R37)

The headphone sidetone trimmer (R37) adjusts the loudness of your own voice heard in your headset when the microphone is on and the speaker is off. (It does not affect the actual level heard on the intercom lines.) This trimmer is preset so that your voice level in the headphones will be approximately $\frac{3}{4}$ of the intercom line level. To prevent feedback, this signal is automatically turned off when the external speaker is turned on with the SPKR ON switch.

Speaker Dim Adjustment (R157)

When an external speaker is used, switching the microphone on will cause the speaker level to attenuate. The level of attenuation may be adjusted with the speaker dim trimmer (R157). The minimum attenuation of 6 dB is preset at the factory (R157 fully clockwise). The range of adjustment is -6 dB to -40 dB.

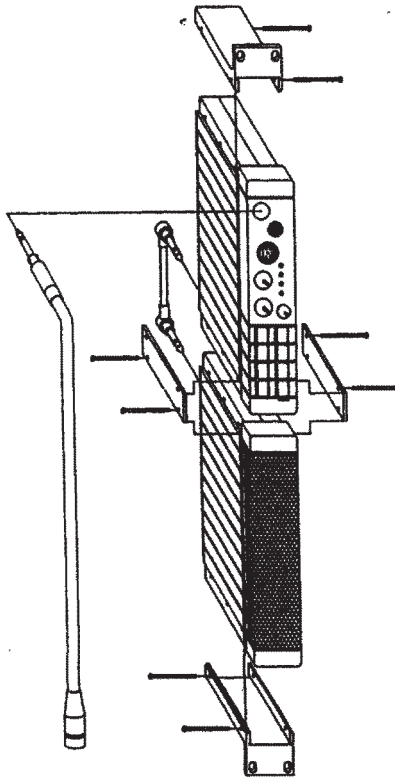
Mechanical Installation

Dimensional requirements for the various mounting configurations are illustrated in Section 6. Also allow an additional 4.0 inches (102 mm) of rear panel clearance for connectors.

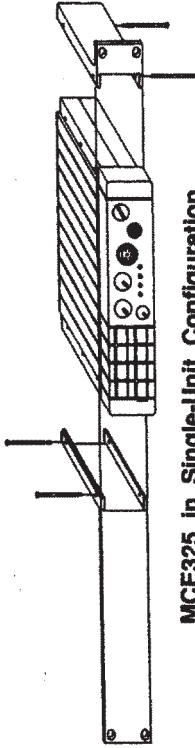
If the headset connector is remotely located (See “External Headset”), allow space between the cable and interfering sources such as TV monitors, power supplies and equipment with internal power supplies. The MCE325 has no special ventilation space requirements.

Assembly of optional mounting components is shown in Figure 2.3.

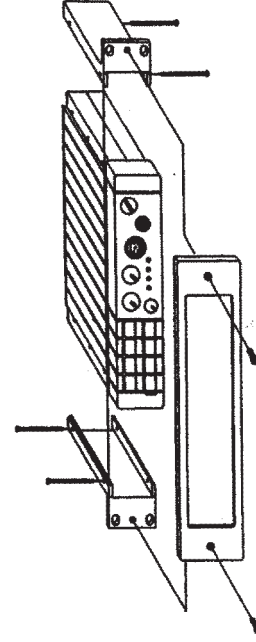
Figure 2.3 Mounting configurations.



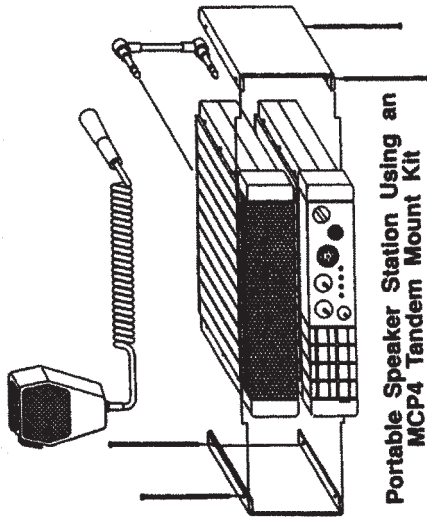
MCS325 and MCE325 in Side-By-Side Rack Mount Configuration Using an MCP1 Rack Mount Kit



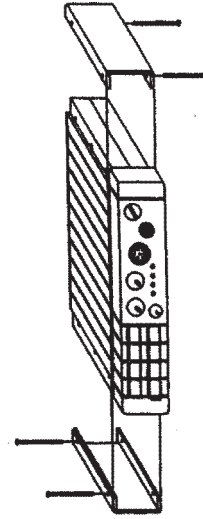
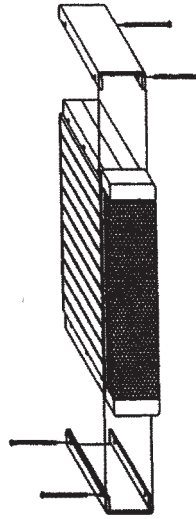
MCE325 in Single-Unit Configuration Using an MCP2 Rack Mount Kit



MCE325 in Console Mount Configuration Using an MCP3 Console Mount Kit



Portable Speaker Station Using an MCP4 Tandem Mount Kit



MCP8 Side Channels Assembled to an MCS325 or MCE325 for Tabletop Use

Electrical Installation

AC Power and Fuse

The Model MCE325 is pre-wired for either 115 or 230 VAC operation, and the appropriate fuse is already installed. The MCE325 uses a 0.5A Slo-Blo fuse for 115 volt operation, or a 0.25A Slo-Blo fuse for 230 volt operation. (A fused external DC source may be used instead of AC power if desired. (See “External DC Power Source”.)

Intercom Lines J8, J9, and J10

General

Intercom line connectors J8 and J9 are parallel-wired for loop-through connection to other intercom stations. These connectors are used for connection of two-wire lines to channels one and two (full-duplex operation), or for connection of four-wire channel A output (channel A input is connected at the auxiliary connector).

Intercom line connector J10 is used for connection of two-wire lines to channels three and four (full-duplex operation), or for connection of four-wire channel B output (channel B input is connected at the auxiliary connector).

Connector Pin-outs

Table 2.4 Connectors J8 and J9.

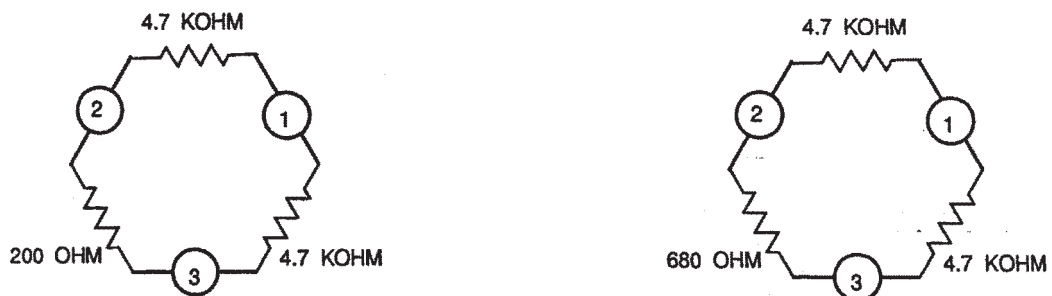
PIN #	FUNCTION
1	Common (low side of line)
2	Two-wire CH 1 or four-wire CH A high output
3	Two-wire CH 2 or four-wire CH A low output

Table 2.5 Connection J10

PIN #	FUNCTION
1	Common (low side of line)
2	Two-wire CH 3 or four-wire CH B high output
3	Two-wire CH 4 or four-wire CH B low output

Four-wire Output Termination

Figure 2.4 4-wire output terminations.



When four-wire outputs are used, termination resistors must be installed for proper operation. The output amplifiers are current sources, and the output level is determined by the terminating

resistor values. These resistors would normally be installed in the cable connector, but may be placed at any point in the signal path. Recommended values are shown in X.

Program Inputs, J14 and J15

The PROGRAM A and B inputs accept line-level (0 dBu nominal), balanced audio. The program inputs are connected using ¼-inch stereo phone plugs.

Figure 2.5 Connectors J14 and J15.

SECTION	FUNCTION
Tip	Program high
Ring	Program low
Sleeve	Common

The MCE325 must be internally programmed to assign the program inputs to the intercom lines, headphones, or speaker output (see “Program Assignment”). Program volume to the headphones and speaker is controlled by the PGM VOL control on the front panel.

External Speaker, J27

The SPEAKER OUTPUT jack provides a bridging-type output for an external speaker (8 ohms minimum). The external speaker is connected using a ¼-inch phone plug.

Figure 2.6 Connector J27.

SECTION	FUNCTION
Tip	Speaker plus
Ring	Speaker minus
Sleeve	No connection

CAUTION The MCE325 provides a bridging-type speaker output. DO NOT LET EITHER SPEAKER LEAD CONTACT GROUND.

The external speaker is turned on and off by the front panel SPKR ON switch.

Auxiliary Connector, J22

Four-Wire Channel A and B Input

The four-wire channel A and channel B inputs are connected at the auxiliary connector as follows:

Table 2.6 Auxiliary connector, J22.

PIN #	FUNCTION
8	Four-wire channel A high
21	Four-wire channel A low
9	Four-wire channel B high
22	Four-wire channel B low

The four-wire inputs must be assigned, using internal programming jumpers J19 and J20, before they can be used (as previously described in “Intercom Line-Channel Configurations (DS1-DS3, J6, J7, J19 & J20).”

Key outputs – Expanded IFB Option

Four logic-type outputs are available at pins 6, 7, 19, and 20 of the auxiliary connector:

Table 2.7 Auxiliary connector, J22.

PIN #	FUNCTION
6	CH 1 or four wire CH A key output
7	CH 3 or four-wire CH B key output
19	CH 2 key output
20	CH 4 key output

There are internal pull-up resistors on the CH 3 and CH 4 key outputs. Pressing the CH 3 or CH 4 talk button will result in a logic high to low transition at the corresponding key output. (Logic high is approximately 13 VDC; Logic low is less than 2 VDC.) There are no internal pull-up resistors on the CH 1 and CH 2 key outputs. These outputs will “float” until externally loaded.

The channel three and four key outputs may also be used to expand the IFB function, allowing any one of several MCE325 User Stations to interrupt a single-point program source and talk on the interrupted channel. For example, if one MCE325 is operating with PROGRAM A assigned to channel three, the channel three key output of a second MCE325 User Station (with no program connected) can be directly connected to the channel three key output of the first MCE325; activating channel three for talk from either station will now interrupt the program source and permit that station to talk on channel three.

Remote Microphone Switch

A remote microphone switch may be connected at the auxiliary connector. Connect mic switch high to pin 25; connect mic switch low to pin 10 or 11. When the switch is closed, the microphone will turn on, and the front panel MIC ON LED will illuminate. When the remote switch is off, the microphone may be turned on from the front panel. When the remote switch is on however, the microphone cannot be turned off from the front panel.

ISO Connection

To connect an RTS Model VCP6A, VCP12A, or VCP12B ISO Control Panel to the MCE325, connect the unswitched microphone output of the MCE325 (pins 1 and 14 of the auxiliary connector) to the four-wire input of the VCP Control Panel; connect the four-wire output of the VCP Control Panel to either a four-wire input or a program input of the MCE325; connect the logic contact output of the VCP Control Station to the ISO input of the MCE325 (pin 12 of the auxiliary connector); connect VCP common to pin 11 of the auxiliary connector.

External Headset

An external headset may be connected to the auxiliary connector. (See “Headset Requirements”.) Connect headphone left to pin 5, headphone right to pin 18, and headphone common to pin 17. Connect microphone high to pin 4; connect microphone low to pin 16. The external headset connections are wired in parallel with the front panel dynamic headset connector; therefore, use only one at a time.

In the headset connecting cable, prevent coupling between the microphone and headphone leads by using a shielded twisted pair for the microphone, and a separate shielded twisted pair for the headphones. Do not allow headphone common to contact microphone low. Tie the headphone shield to headphone common. The headset cable can be made longer when the microphone and headphone pairs are physically separated. The wider the separation, the longer the allowable cable length. Estimated maximum usable headphone cable lengths are as follows:

Single cable, two shielded twisted pairs: 10 feet (3.05 m). Dual-ribbed cable, two shielded twisted pairs: 30 feet (9.14 m).

Separate shielded twisted pair cables: 50 feet (15.24 m). Balanced microphone input: up to 100 feet (30.48 m).

External Electret Microphone

An external electret microphone may be connected at the auxiliary connector and used in place of a front-panel gooseneck microphone. Connect microphone high/bias to pin 15 and connect microphone low to pin 2. When using an external microphone, do not connect a front-panel gooseneck microphone.

Unswitched Microphone Output

The microphone audio is provided as an unswitched, balanced output at the auxiliary connector. The in-phase signal is available at pin 1; the inverted-phase is available at pin 14.

External DC Power Source

The MCE325 may be powered from an external DC power supply in the 10 to 25 volt range (500 mA minimum).

If the external supply is in the 10 to 15 volt range, connect the positive lead to pin 13 of the auxiliary connector and connect the minus lead to pin 10 or 11. A 0.5 Amp slo-blo fuse should be connected in-line for 17 to 24 volt operation.

Remote Speaker Mute Control

When the MCE325 is used with an external speaker, the speaker may be muted from a remote location. Applying a logic low signal to pin 25 of the auxiliary connector will cause muting. Connect circuit common to pin 11.

Front Panel Headset Connections

Headset Requirements

Use headphones with an impedance of 25 ohms or greater. Low impedance 8 ohm headphones are not recommended. Headphones with good acoustic isolation (20 to 40 dB) improve communication in high ambient noise environments, and allow the user to use the headphones at a less tiring, lower volume.

Headset Connections

Dynamic-microphone headset connector: XLR-6 type receptacle.

Table 2.8 Dynamic-microphone headset connector.

PIN #	FUNCTION
1	Balanced mic low/unbalanced mic common
2	Balanced/unbalanced mic high
3	Headphone/mic switch common
4	Headphone left
5	Headphone right
6	Mic Switch high

Carbon-microphone headset connector: ¼-inch, tip-ring-sleeve phone jack.

Table 2.9 Carbon-microphone headset connector.

SECTION	FUNCTION
Tip	Carbon microphone
Ring	Headphone
Sleeve	Common/ground

OPERATION

General

The front panel buttons have different functions when the MCE325 is switched from operating mode to setup mode. Legends on the buttons indicate their operating mode functions; legends under the buttons indicate their setup mode functions. All of the front panel buttons were pre-programmed for a certain type of operation. This is the default configuration. Operation for the default configuration is described first, and is then followed by front panel programming instructions to alter the operation.

Operating Instructions

Momentary/Latching Button action

The channel selector buttons and the MIC ON button feature a special momentary/latching dual-action: if a button is pressed and released quickly it will “latch” (turning “on” if off or turning “off” if on); if the button is pressed and held slightly longer, the action will be momentary and the button will turn off when released. All other buttons are latching-only (press to activate, press to release).

NOTE The latching action can be disabled through the front panel programming.

LED Indicators

LED indicators are provided for each button to indicate current status. The LED can provide up to four indications: continuously off, continuously on, short blink (50% on, 50% off) and long blink (90% on, 10% off).

Channel Selection

Table 3.1 summarizes the operation of the channel selector buttons for the various intercom line configurations. Basically, four-wire intercom lines always use one TALK and one LISTEN button for intercom communication, as do two-wire lines when the station has been programmed for two-channel operation.

When the station is operated in four-channel mode, however, each two-wire intercom line uses only one channel selector button to control both talk and listen, and the MCE325 is pre-programmed so that a channel is activated for both talk and listen when the button is pressed. The

button action can be changed, via the front panel programming, so that the button controls talk only, with listen either always on or always off.

Panel Mic/Headset Mic Selection

The PANEL MIC button selects either panel microphone (LED on) or headset microphone (LED off).

Microphone On/Off

The MIC ON button turns the microphone on (LED on) or off (LED off).

NOTE The MCE325 can be programmed, via the front panel, so that the microphone will automatically turn on whenever a channel is activated for talk. The MCE325 may also be internally programmed for voice-activated microphone (VOX) as previously described in Section 2.

Speaker On/Off

The SPKR ON button turns the external speaker on (LED on) or off (LED off).

Volume Adjustment

Table 3.1 summarizes the operation of the volume controls for the various intercom line configurations. The MCE325 is pre-programmed for stereo operation; CH 1 (VOL 1) adjusts the level to the left headphone and CH 2 (VOL 2) adjusts the level to the right.

NOTE The MCE325 can be programmed, via the front panel, for monaural operation if desired.

The PGM VOL control adjusts the monaural mix of both program inputs to both headphones and to the external speaker. It does not affect the program volume on the intercom lines.

Front Panel Sidetone Nulling Trimmer Adjustment

When the MCE325 is used with two-wire lines, the station operator's voice signal is not only transmitted onto the intercom lines, but also echoed back into the MCE325 receive circuits. This can result in acoustic feedback when the MCE325 is used with an external speaker. The sidetone nulling trimmers are used to null, or subtract, the station operator's voice signal from the rest of the received signal to prevent this feedback. (NOTE: This is not necessary in four-wire systems since transmit and receive use separate circuits.) A trimmer is provided for each of the four channels. The trimmers are factory-preset for maximum nulling of the microphone signal when an ideal 200-ohm resistance terminates each intercom channel; however, the trimmers may require slight readjustment after the MCE325 has been installed to compensate for variations from the ideal.

To adjust the sidetone nulling trimmers:

- 1 Turn the speaker switch on (even if an external speaker is not connected). This will turn off the internal, true sidetone trimmer (see note below).
- 2 Turn on the microphone.
- 3 Activate one talk button at a time, and speak into the microphone. Slowly increase the volume, and note the level of your voice in the headphones or speaker. Adjust the corresponding sidetone nulling trimmer to minimize your voice signal. Repeat for each channel being used, making sure that only one channel is activated at a time.

NOTE There is also an internal, true sidetone trimmer, which allows the station operator to hear his or her voice when using headphones. This sidetone signal is turned off when the speaker switch is

turned on to prevent feedback. See “Headphone Sidetone Trimmer Adjustment (R37)” for further details.

Sending and Receiving Call Signals

To call a channel:

- 1 Press the CALL button; the CALL LED’s will flash to indicate “call signal ready”.
- 2 Press and hold the talk button for the channel to be called; the call signal will be transmitted as long as the talk button is held.
- 3 When a response is received, release the talk button to turn off the call signal.

Receiving a call:

When there is an incoming call, the indicator LED above the appropriate channel selector button will flash.

Using the Talk-Off Feature

The talk-off feature deactivates the mic switches of all remote user stations on a selected channel. To use talk-off:

- 1 Press and release the CALL button three times in rapid succession; the CALL LED’s will turn on to indicate “talk-off signal ready”.
- 2 Momentarily press the talk button for the channel to be deactivated. This will cause the talk-off signal to be transmitted.
- 3 Release the talk button to end the talk-off signal transmission.

Front Panel Programming

Activating Setup Mode

Press and hold the CALL button for 5 seconds: the TALK 1, LISTEN 1, TALK 2, LISTEN 2, PANEL MIC, SPKR ON, and MIC ON LED’s will begin to flash. This is the main menu.

Menu Selection/Ending Setup

The submenu names are listed under the switches. Press the desired switch to access the submenu for that switch. Press the CALL button from a submenu to return to the main menu; press the CALL button again to exit from the main menu to the operating mode.

NOTE If no submenu is selected from the main menu within 12 seconds after program mode activation, the programming mode will time out, and the MCE325 will return to normal operation. If a submenu is selected, however, the unit will remain in programming mode until intentionally exited.

Submenus

The following paragraphs describe each of the submenus. The default, or factory pre-programmed setting, is also indicated for each submenu.

Channel ID

The MCE325 can be programmed so that when someone is talking on an intercom channel, the corresponding listen button LED will flicker as they talk to provide a visual indication of which channel is talking. With the Channel ID submenu selected, press each TALK button to select or deselect Channel ID. The button's LED will indicate the Selected mode as follows:

Short LED blink: Channel ID disabled. (default).

Long LED blink: Channel ID enabled.

Four-channel Listen

When the MCE325 is operating in four-channel mode, each channel selector button may be individually programmed for one of three types of operation. With the Four-channel Listen submenu activated, press each channel selector button one or more times to select the desired type of operation as follows:

Short LED blink (90% on, 10% off): Button must be pressed to talk or listen (default).

Long LED blink (50% on, 50 % off): Listen will always be on; button must be pressed to talk.

LED off: listen will always be off; button must be pressed to talk.

Mono

The headphone output may be configured for either monaural or stereo operation. With the Mono submenu selected, press the Mono button one or more times to select the type of headphone output as follows:

Long LED blink: (50% on, 50 % off): Stereo (default).

Short LED blink: (90% on, 10 % off): Monaural.

Call Disable

Call disable prohibits incoming or outgoing call indication and signaling on selected channels. With the Call Disable submenu selected, press each talk button to select the desired operation as follows:

Short LED blink (90% on, 10 % off): Call function enabled (default).

Long LED blink (50% on, 50% off): Call function disabled.

Button Lock

Button lock permits all buttons (except CALL) to be individually programmed for one of three types of operation. With the Button Lock submenu selected, press each button one or more times to select the desired type of operation as follows:

Short LED blink (90% on, 10% off): No button lock (default).

Long LED blink (50% on, 50% off): Button locked in the "on" position.

LED off: Button locked in the "off" position.

Latch Disable

Latch disable may be used to prohibit latching action for individual channel selector buttons and the MIC ON button. With the Latch Disable submenu selected, press each channel selector button or the MIC ON button one or more times to select the desired type of operation as follows:

Short LED blink (90% on, 10% off): Latching enabled (default).

Long LED blink (50% on, 50% off): Latching disabled.

Instant Mic

Talk buttons may be individually programmed to automatically activate the microphone when pressed. With the Instant Mic submenu selected, press each talk button one or more times to select the desired type of operation as follows:

Short LED blink (90% on, 10% off): Instant mic off (default).

Long LED blink (50% on, 50% off): Instant mic on.

Reset

To restore the original programming, hold down the CH 1 talk button for about two seconds while powering up the MCE325.

Table 3.1 Front panel control usage for the various intercom line configurations.

VOLUME CONTROL USAGE		CHANNEL SELECTOR BUTTON USAGE			
CH 1 (VOL 1)	CH 2 (VOL 2)	1 TALK	1 LISTEN	2 TALK	2 LISTEN
Configuration 1: Two -2-wire lines (CH 1 & CH 2). (Default configuration.)					
CH 1	CH 2	CH 1 TALK	CH1 LISTEN	CH 2 TALK	CH 2 LISTEN
Configuration 2: Three or four 2-wire lines (CH 1, CH 2, CH 3, CH 4).					
CH 1 & CH 3	CH 2 & CH4	CH 1 TALK & LISTEN	CH 2 TALK & LISTEN	CH 3 TALK & LISTEN	CH 4 TALK & LISTEN
Configuration 3: One 2-wire line (CH 1); One 4-wire line (CH B).					
CH 1	CH B	CH 1 TALK	CH 1 LISTEN	CH B TALK	CH B LISTEN
Configuration 4: Two 2-wire lines (CH 1 & CH 2); One 4-wire line (CH B).					
CH 1	CH 2 & CH B	CH 1 TALK & LISTEN	CH 2 TALK & LISTEN	CH B TALK	CH B LISTEN
Configuration 5: Two 2-wire lines (CH 3 & CH 4); One 4-wire line (CH A).					
CH A & CH 3	CH 4	CH A TALK	CH A LISTEN	CH 3 TALK & LISTEN	CH 4 TALK & LISTEN
Configuration 6: Two 4-wire lines (CH A & CH B).					
CH A	CH B	CH A TALK	CH A LISTEN	CH B TALK	CH B LISTEN

MAINTENANCE

Preventive Maintenance

Clean the unit and verify its performance periodically.

Factory Support Information

Factory support information is located on the first page of this manual.

Corrective Maintenance

WARNING: Hazardous voltages exist inside the MCE325. Attempting diagnosis, repair, or adjustment with the AC line connected could result in serious injury or death. These servicing instructions are for qualified personnel only.

Access

- 1 Reference the AS6464 drawing in section 6. Remove the four long screws (item 4) and the two short screws (item 5).
- 2 Lift off the top cover.
- 3 Pull the front panel slightly forward to clear the carbon mic jack on the main circuit board. Lift the front panel slightly while sliding the back panel toward the rear and out of the lower case. The MCE325 may now be operated for troubleshooting.

NOTE when reassembling the bottom cover, make sure the rubber button on the inside of the bottom cover (item 7) is toward the front of the unit.

Front Panel Removal

- 1 Unplug the panel mic (J1) and dynamic-mic headset (J2) connectors from the main circuit board.

- 2 The ribbon connector from the front panel board to the main board is attached at both ends with locking connectors. To unlock the connector, pull the outer shell away from the circuit board. Then, pull the ribbon cable out.

Cleaning

Clean the front panel and case with alcohol or a mild solution of detergent and water, and then wipe off detergent residue with a damp rag. Clean the circuit board (if necessary) with a tetrafluoroethane product such as Flux-Off® CZ by Chemtronics®. Use eye protection and avoid breathing the vapors with these solvents. Also, avoid getting the solvent in any of the potentiometers.

Test and Adjustment Procedures

Notes

- All AC voltages are RMS unless otherwise specified.
- All input and output levels were measured using an AC voltmeter calibrated for $1 \text{ mW} = 0.775 \text{ V}$ at 600 ohms, but with the 600 ohms in the circuit (0 dBu).
- The following procedures involve changing the MCE325 programming. It may be useful to note the current positions of all jumpers and DIP switches so that they can be returned to their proper positions after testing.
- The inside of the top cover contains a location diagram for the programming jumpers and DIP switches. Place it next to the MCE325 during testing for convenient reference.
- Test procedures are written to be performed in the order presented.

Test Equipment

- Variac
- 15 MHz Oscilloscope
- AC Voltmeter
- Frequency Counter
- DC Voltmeter
- Balanced Audio Generator
- 400 Hz to 30 kHz bandpass filter with +40 dB of gain

Power Supply Test

- 1 Set a variac to 117 VAC, 60 Hz, and connect the MCE325 to the variac. Observe that each LED blinks on in sequence, and then all LED's are off.
- 2 Measure the voltage across the secondary of T1 (between test points E7 and E8 on the main circuit board).

$$V_{\text{sec}} = 18 \pm 1.8 \text{ VAC}$$

- 3 Measure the DC voltage across the “+” and “-“ terminals of bridge rectifier CR1.

$$V_{\text{CR1}} = 23 \pm 2.3 \text{ VDC}$$

- 4 Measure the ripple.

$$V_{\text{ripple}} = 140 \text{ mVp-p}$$

- 5 Measure the regulated DC voltage at U26 pin 2. (There should be no ripple.)

$$V_{\text{U26-2}} = 13.85 \pm 0.3 \text{ VDC}$$

- 6 Measure the mid-voltage source at U17 pin 7.

$$V_{\text{U17-7}} = 6.93 \pm 0.3 \text{ VDC}$$

- 7 Measure the +5 V source at the output of U27 pin 2.

$$V_{\text{U27-2}} = 5.0 \pm 0.3 \text{ VDC}$$

Initial Configuration

- 1 Set all internal jumpers and DIP switches as follows:

DIP Switches: Set all DIP switches, except DS3, to the default settings listed in Table 2.1. Set DS3 to on. (This places the MCE325 in four-channel mode. Refer to Figure 1.11 for names of buttons in standard four-channel mode.)

Jumpers: Set all jumpers, except J24, to the default settings listed in Table 2.2. Set J24 to the balanced mic position (pins 1 and 2 shorted).

- 2 Connect a 200-ohm termination resistor across each of the four intercom channels:

CH 1: J8 pins 1 and 2

CH 2: J8 pins 1 and 3

CH 3: J10 pins 1 and 2

CH 4: J10 pins 1 and 3

- 3 Set all front panel buttons to off.

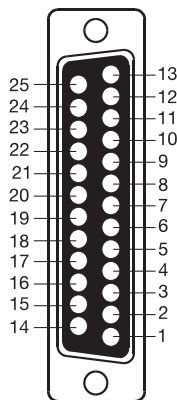
- 4 Set all volume controls to minimum.

Keying Output Test

- 1 Connect two 47 k ohm resistors: one from the key 1 output (J22 pin 6) to the +14 VDC supply; and one from the key 2 output (J22 pin 19) to the +14 VDC supply.

NOTE The cathode of D22 serves as a convenient connection point for the +14 VDC supply. (Refer to the AS6245 drawing in Section 6 for the location of D22.) The key 1 and key 2 outputs require external pull-up resistors. The key 3 and key 4 outputs have internal pull-up resistors (RP2B and RP2D respectively) and do not require external pull-ups.

Figure 4.1 Auxiliary connector, J22.



- 2 Set the MIC ON button to on. Set all other front panel buttons to off.
- 3 Check for 13 VDC minimum at the key 1 output.
- 4 Turn CH 1 TALK on and check for less than 2 VDC at the key 1 output.
- 5 Repeat steps 3 and 4 for the other channels:
 - CH2 TALK: key 2 out (J22 pin 19)
 - CH3 TALK: key 3 out (J22 pin 7)
 - CH4 TALK: key 4 out (J22 pin 20)
- 6 Remove the 47 kohm pull-up resistors when finished.

USMB (Un-Switched Microphone Balanced) Frequency Response and Level Check

- 1 Set all front panel buttons to off.
- 2 Connect a signal generator to the DYN MIC HEADSET jack mic input (J2 pins 1 & 2).
- 3 Connect a 600 ohm resistor across the USMB output (J22, pins 1 and 14).
- 4 Connect an AC voltmeter across the 600 ohm resistor.
- 5 Verify the output levels for the input frequencies and levels in Table 4.2.
- 6 Remove the 600 ohm resistor across the USMB output.

Frequency Response and Level Check, Mic to Line

Four-Channel, Two-Wire Mode

- 1 Activate the MIC ON button. (All other front panel buttons should be off.)
- 2 Connect an AC voltmeter across the channel 1 output. The signal generator should still be connected to the dynamic mic input.
- 3 Activate the CH 1 TALK button.
- 4 Verify the output levels for the input frequencies and levels in Table 4.3.
- 5 Repeat for channels 2 through 4 by connecting the AC voltmeter across the appropriate output, activating the appropriate TALK button, and measuring the output level:

Table 4.1 Talk button vs. output.

TALK BUTTON	OUTPUT
CH 2	J8, pins 1 and 3
CH 3	J10, pins 1 and 2
CH 4	J10, pins 1 and 3

Table 4.2 USMB frequency response and level check.

INPUT FREQUENCY	INPUT LEVEL	OUTPUT LEVEL
1 kHz	-55 dBu (1.4 mV) -45 dBu (4.35 mV) -25 dBu (43.5 mV)	-1 ±3 dBu (0.49 – 0.98 VAC) 2.5 ±2 dBu (0.83 – 1.32 VAC) 2 ±2 dBu (0.75 – 1.2 VAC)
100 Hz	-55 dBu (1.4 mV) -45 dBu (4.35 mV) -25 dBu (43.5 mV)	-0.5 ±3 dBu (0.51 – 1.03 VAC) 4.2 ±2 dBu (0.98 – 1.55 VAC) 4.2 ±2 dBu (0.98 – 1.55 VAC)

Table 4.2 USMB frequency response and level check.

10 kHz	-55 dBu (1.4 mV)	-5.7 ±3 dBu (0.28 – 0.57 VAC)
	-45 dBu (4.35 mV)	2.2 ±2 dBu (0.79 – 1.26 VAC)
	-25 dBu (43.5 mV)	2.5 ±2dBu (0.83 – 1.32 VAC)

Table 4.3 Mic to line response; 4-channel, 2-wire mode.

INPUT FREQUENCY	INPUT LEVEL	OUTPUT LEVEL
1 kHz	-45 dBu	-0.8 ±2 dBu (0.56 – 0.89 VAC)
100 Hz	-45 dBu	-0.8 ±2 dBu (0.56 – 0.89 VAC)
100 kHz	-45 dBu	0.8 ±2 dBu (0.56 – 0.89 VAC)

Two-Channel, Four-Wire Mode

- 1 Remove the 200 ohm terminations from intercom channels 1 through 4.
- 2 Program the MCE325 to be in two-channel, four-wire mode. (See Table 2.3, configuration 6 for switch settings. See Figure 1.11 for names of buttons in standard two-channel mode.)
- 3 Connect 200 ohm termination resistors across the four-wire A and four-wire B channels:
 - Four-Wire A: J8 pins 2 and 3
 - Four-Wire B: J10 pins 2 and 3

NOTE Normally, the four-wire outputs would be terminated with 600 ohms for four-wire operation, but 200 ohms are used for testing purposes.

- 4 Set the MIC ON button to on. Set all other front panel buttons to off.
- 5 Connect an AC voltmeter across the Four-Wire A output.
- 6 The signal generator should still be connected to the mic input. Set it to 1 kHz, -45 dBu.
- 7 Activate CH 1 TALK.
- 8 The output level should read -0.8 dBu ±2 dBu (0.56 – 0.89 VAC)
- 9 Connect the AC voltmeter across the Four-Wire B output.
- 10 Turn off CH 1 TALK and activate CH 2 TALK.
- 11 The output level should read -0.8 dBu ±2 dBu (0.56 – 0.89 VAC)
- 12 Remove the 200 ohm termination resistors.

Sidetone Null Test and Adjustment

NOTE This procedure verifies sidetone null operation and optimizes nulling for an ideal 200 ohm line termination. Since actual intercom line impedance may vary from the ideal, the MCE325 may have to be readjusted slightly during actual use.

- 1 Reprogram the MCE325 to be in four-channel, two-wire mode (Table 2.3, configuration 2).
- 2 Reconnect 200 ohm termination resistors across each of the four intercom channels.
- 3 Set the MIC ON button to on. Set all other front panel buttons to off.
- 4 The signal generator should still be connected to the mic input. Set it to 1 kHz, -45 dBu.
- 5 Activate the CH 1 TALK button.
- 6 Monitor the AC signal level at U5 pin 7.
- 7 Adjust R57 (Sidetone 1 on front panel) for maximum null (minimum signal level) at U5 pin 7. The signal should be 0.025 VAC or less.

- 8 Repeat for channels 2 through 4 by activating the TALK buttons, connecting to the test points and adjusting the potentiometers as indicated in Table 4.4.

True Sidetone Adjust

- 1 Configure the DYN MIC HEADSET jack for stereo mode (See Section 3, “MONO”)
- 2 Set all front panel buttons to off.
- 3 Connect 51 ohm load resistors across the left headphone output (J2 pins 3 and 4) and right headphone output (J2 pins 3 and 5).
- 4 Connect an AC voltmeter across the left headphone output.
- 5 Remove the signal generator from the mic input, and connect it across intercom channel 1. Adjust the generator output to -1 dBu (0.69 VAC), 1 kHz.
- 6 Activate the CH 1 TALK button, and adjust the CH 1-3 volume control (R1) until you measure 11.2 dBu (2.82 VAC) across the left headphone output.
- 7 Disconnect the signal generator from intercom channel 1. Adjust the generator for minimum output, and reconnect it across the DYN MIC HEADSET jack mic input (J2 pins 1 & 2). Readjust the generator output level to -45 dBu, 1 kHz.
- 8 Turn on the MIC ON button.
- 9 Adjust R37 (sidetone) on the MCE325 main board to obtain 8.7 dBu (2.1 VAC) at the left headphone output.

Level and Frequency Response Check, Intercom Channel to Headphone

- 1 Set all front panel buttons to off.
- 2 Remove the signal generator from the mic input, and reconnect it across intercom channel 1.
- 3 Adjust the signal generator output to -1 dBu, 1 kHz.
- 4 Preset the CH 1-3 volume control to the 2 o'clock position.
- 5 Activate the CH 1 TALK button. The left headphone output level should be 11.2 ± 2 dBu (2.2 to 3.6 VAC).
- 6 Adjust the CH 1-3 volume control to measure 11.2 dBu (2.8 VAC) at the left headphone output. Check for no distortion or clipping in the output.
- 7 Adjust the signal generator output to -1 dBu, 100 Hz. The left headphone output should read 10.2 ± 2 dBu (1.9 to 3.2 VAC)
- 8 Adjust the signal generator output to -1 dBu, 10 kHz. The left headphone output should read 7.8 ± 2 dBu (1.5 to 2.4 VAC).
- 9 Repeat the test for channels 2 through 4. For channel 3, continue to use the CH 1-3 volume control and monitor the left headphone output. For channels 2 and 4, use the CH2-4 volume control and monitor the right headphone output.

Table 4.4 Channel 1-4 sidetone trimmer adjust.

TALK BUTTON	TEST POINT	POTENTIOMETER
CH 1	U5 pin 7	R57 (Sidetone 1)
CH 2	U5 pin 1	R73 (Sidetone 2)
CH 3	U7 pin 1	R88 (Sidetone 3)
CH 4	U7 pin 7	R104 (Sidetone 4)

Level and Frequency Response Check, Intercom Channel to Speaker

- 1 Set all front panel buttons to off. Set all volume controls to minimum.
- 2 Connect an 8 ohm load across the speaker output (J27, tip and ring)
- 3 Connect an AC voltmeter and an oscilloscope across the speaker output.
- 4 Connect the signal generator to intercom channel 1, and adjust the generator output to -1 dBu, 1 kHz.
- 5 Set the SPKR ON and CH 1 TALK buttons to on.
- 6 Rotate the CH 1-3 volume control (R1), and check that the speaker output level reaches $+18$ dBu (17.4 Vp-p) before clipping.
- 7 Set the CH 1-3 volume control to get $+15$ dBu (4.4 VAC) at the speaker output. The volume control should be approximately at the 2 o'clock position.
- 8 Activate speaker muting by grounding J22 pin 25 to pin 10. The speaker output level should drop to 5 mV or less, and the SPKR LED should turn off. Remove the ground connection.
- 9 Activate speaker dim by grounding U15 pin 9.
- 10 Adjust R157 to the maximum clockwise position. The speaker output should be -5.5 dB ± 1 dB below the level set in step 7.
- 11 Adjust R157 to the maximum counter-clockwise position. The speaker output should be -39.5 dB ± 2 dB below the reference level set in step 7.
- 12 Reset R157 to the maximum clockwise position, and remove the speaker dim ground (U15 pin 9).
- 13 Set the signal generator to -1 dBu, 100 Hz. The speaker output should be 10.8 dBu ± 2 dBu.
- 14 Set the signal generator to -1 dBu, 10 kHz. The speaker output should be 17.5 dBu ± 2 dBu.

Level and Frequency Response, Program to Headphones and Speaker

Program A to Left Headphone

- 1 Set all front panel buttons to off. Set all volume controls to minimum.
- 2 Set program jumpers J16, J17 and J18 to assign PROGRAM A and PROGRAM B inputs to the headphones and speaker (pins 1 & 2 shorted on all three jumpers).
- 3 Remove the signal generator from channel 1, and reconnect it to the PROGRAM A input (J14 tip and ring).
- 4 Set the signal generator to 0 dBu, 1 kHz.
- 5 Set the PGM VOL control to maximum.
- 6 Measure the level at the left headphone output. It should be 1.3 dBu ± 2 dBu.
- 7 Set the signal generator to 0 dBu, 100 Hz. The left headphone output should be 0.8 dBu ± 2 dBu.
- 8 Set the signal generator to 0 dBu, 10 kHz. The left headphone output should be -3.8 dBu ± 2 dBu.
- 9 Reset the generator to 0 dBu, 1 kHz.
- 10 Remove jumper J16 (program not assigned to left headphone). Verify that the signal level drops at least 35 dB from the reference level in step 9.

11 Restore jumper J16 to short pins 1 & 2.

Program B to Right Headphone

- 1 Remove the signal from the PROGRAM A input, and connect it to the PROGRAM B input.
- 2 Measure the level at the right headphone output (J2, 3 & 5). It should be 1.3 dBu \pm 2 dBu. (Program volume at maximum.)
- 3 Set the signal generator to 0 dBu, 100 Hz. The right headphone output should be 0.8 dBu \pm 2 dBu.
- 4 Set the signal generator to 0 dBu, 10 kHz. The right headphone output should be -3.8 dBu \pm 2 dBu.
- 5 Reset the generator to 0 dBu, 1 kHz.
- 6 Remove jumper J17 (program not assigned to right headphone). Verify that the signal level drops at least 35 dB from the reference level in step 2.
- 7 Restore jumper J17 to short pins 1 & 2.

Program to Speaker

- 1 Connect the AC voltmeter across the 8 ohm load at the speaker output
- 2 Set the SPKR ON button to the on position.
- 3 Measure the level at the speaker output. It should be 6 dBu \pm 2 dBu. (Program volume at maximum.)
- 4 Set the signal generator to 0 dBu, 100 Hz. The speaker output should be 1.3 dBu \pm 2 dBu.
- 5 Set the signal generator to 0 dBu, 10 kHz. The speaker output should be 7.3 dBu \pm 2 dBu.
- 6 Reset the generator to 0 dBu, 1 kHz.
- 7 Remove jumper J18 (program not assigned to speaker). Verify that the signal level drops at least 35 dB from the reference level in step 3.
- 8 Restore jumper J18 to short pins 1 & 2.

IFB Test

IFB B

- 1 Set all front panel buttons to off. Set all volume controls to minimum.
- 2 Move the J5 jumper to short pins 1 and 2 (IFB B assigned to channel 4).
- 3 Check the output level across intercom channel 4. It should be -9.8 dBu \pm 2 dBu.
- 4 Turn on the CH 4 TALK and MIC ON buttons. The channel 4 output should drop at least 45 dB from the reference level in step 3.
- 5 Turn off the CH 4 TALK and MIC ON buttons.
- 6 Ground the Key 4 input (short J22 pin 20 to pin 10). The channel 4 output should drop at least 45 dB from the reference level in step 3.
- 7 Remove the Key 4 ground.
- 8 Move the J5 jumper to short pins 2 and 3.

IFB A

- 1 Move the J4 jumper to short pins 1 and 2 (IFB A assigned to channel 3).
- 2 Remove the signal from PROGRAM B input, and connect it to the PROGRAM A input. Set the signal generator to 0 dBu, 1 kHz.
- 3 Check the output level across intercom channel 3. It should be $-9.8 \text{ dBu} \pm 2 \text{ dBu}$.
- 4 Turn on the CH 3 TALK and MIC ON buttons. The channel 3 output should drop at least 45 dB from the reference level in step 3.
- 5 Turn off the CH 3 TALK and MIC ON buttons.
- 6 Ground the Key 3 input (short J22 pin 7 to pin 10). The channel 3 output should drop at least 45 dB from the reference level in step 3.
- 7 Remove the Key 3 ground.
- 8 Move the J4 jumper to short pins 2 and 3.

Level and Frequency Response Check, Four-Wire Input to Headphone

Four-Wire A Input to Left Headphone

- 1 Set all front panel buttons to off. Set all volume controls to minimum.
- 2 Remove the signal generator from the Program A input, and connect it to the Four-Wire A input (AUXILIARY connector J22, pins 8 and 21). Set the generator to 0 dBu, 1 kHz.
- 3 Move jumper J19 to short pins 3 & 4 (Four-Wire A input always on).
- 4 Set the CH 1-3 volume control to measure 0 dBu at the left headphone output. (The control should be at about the 2 o'clock position.)
- 5 Set the signal generator to 0 dBu, 100 Hz. The left headphone output should be $-0.9 \text{ dBu} \pm 2 \text{ dBu}$.
- 6 Set the signal generator to 0 dBu, 10 kHz. The left headphone output should be $-4.7 \text{ dBu} \pm 2 \text{ dBu}$.
- 7 Move jumper J19 to short pins 2 & 3 (Four-Wire A input off).

Four-Wire B input to Right Headphone

- 1 Remove the signal from the Four-Wire A input, and connect it to the Four-Wire B input (J22, pins 9 & 22).
- 2 Move jumper J20 to short pins 3 & 4 (Four-Wire B input always on).
- 3 Set the CH 2-4 volume control to measure 0 dBu at the right headphone output. (The control should be at about the 2 o'clock position.)
- 4 Set the signal generator to 0 dBu, 100 Hz. The right headphone output should be $-0.9 \text{ dBu} \pm 2 \text{ dBu}$.
- 5 Set the signal generator to 0 dBu, 10 kHz. The right headphone output should be $-4.7 \text{ dBu} \pm 2 \text{ dBu}$.
- 6 Move jumper J20 to short pins 2 & 3 (Four-Wire B input off).

Panel Mic to Channel Test

- 1 Turn all front panel buttons off. Set all volume controls to minimum.
- 2 Remove the signal from the Four-Wire B input and reconnect it to the panel mic input (J28 tip and ring, it is easiest to connect to the back of the connector.).
- 3 Set the signal generator to -25 dBu, 1 kHz.
- 4 Turn on the CH 1 TALK, MIC ON and PANEL MIC buttons.
- 5 Check the channel 1 output. It should be -0.9 dBu ± 2 dBu.

Carbon Mic to Channel Test

- 1 Turn off the PANEL MIC and MIC ON buttons. (Only the CH 1 TALK LED should be on.)
- 2 Connect a 470 ohm resistor across the CARBON MIC HEADSET jack (J3 tip and ring). The MIC ON LED should turn on.
- 3 Remove the signal from the panel mic input, and reconnect it to the CARBON MIC HEADSET jack.
- 4 Set the signal generator to 11.2 dBu, 1 kHz.
- 5 Check the channel 1 output. It should be -0.9 dBu ± 2 dBu.
- 6 Remove the 470 ohm resistor from the carbon mic input.

VOX Test

- 1 Remove the signal from the CARBON MIC HEADSET jack, and reconnect it to the DYN MIC HEADSET jack mic input (J2 pins 1 & 2).
- 2 Set the generator to -45 dBu, 1 kHz.
- 3 Set DIP switch DS8 to the on position (VOX enabled), and note that the MIC ON LED turns on.
- 4 Adjust the signal generator output level to zero, and note that the MIC ON LED turns off.
- 5 Reset DS8 to off.

Mic Kill Receive Test

- 1 Set all buttons to off.
- 2 Remove the signal from the DYN MIC HEADSET jack mic input, and reconnect it to intercom channel 1.
- 3 Adjust signal generator to -5 dBu, 24 kHz (check frequency with frequency counter).
- 4 Set the MIC ON button to on.
- 5 Activate the CH 1 TALK button. The MIC ON LED should turn off.
- 6 Attenuate the signal input by 20 dB. Try turning on the MIC ON button. It should not turn on.
- 7 Attenuate the signal an additional 10 dB. Try turning on the MIC ON button. It should turn on.
- 8 Adjust signal generator to -5 dBu at 22.320 kHz.
- 9 Try turning the MIC ON button on and off. It should turn on and off as usual.
- 10 Adjust the signal generator to -5 dBu at 23.520 kHz.

- 11 Try turning the MIC ON button on. It should not stay on.
- 12 Adjust signal generator to -5 dBu at 25.680 kHz.
- 13 Try turning the MIC ON button on and off. It should turn on and off as usual.
- 14 Adjust signal generator to -5 dBu at 24.480 kHz.
- 15 Try turning the MIC ON button on. It should not stay on.
- 16 Remove the signal generator from channel 1.

Mic Kill Transmit Test

- 1 Set all front panel buttons to off.
- 2 Connect a frequency counter and an AC meter to the intercom channel 1 output.
- 3 Transmit a mic kill signal on intercom channel 1 (tap the CALL button 3 times, then press and hold the CH 1 TALK key).
- 4 Check that the signal on the channel 1 output is between 23.7 to 23.9 kHz at -9.8 dBu ± 2 dBu.
- 5 Release the CH 1 TALK button.

Call Transmit Test

- 1 Set all front panel buttons to off.
- 2 Transmit a call signal on intercom channel 1 (tap the CALL button, and while the call LED is flashing, press and hold the CH 1 TALK key).
- 3 Check that the signal on the channel 1 output is between 19.9 to 20.1 kHz at -9.8 dBu ± 2 dBu.
- 4 Release the CH 1 TALK button.

Call Receive Test

- 1 Set all buttons to off.
- 2 Reconnect the signal generator to intercom channel 1.
- 3 Adjust signal generator to -5 dBu, 20 kHz (check frequency with frequency counter).
- 4 Check that the CALL and CH 1 TALK LED's are flashing.
- 5 Attenuate the signal input by 20 dB, and check that the LED's are still flashing.
- 6 Attenuate the signal an additional 10 dB. The LED's should stop flashing.
- 7 Adjust signal generator to -5 dBu, 18.600 kHz.
- 8 Verify that the LED's do not flash.
- 9 Adjust signal generator to -5 dBu, 21.400 kHz.
- 10 Verify that the LED's do not flash.
- 11 Adjust signal generator to -5 dBu, 19.600 kHz.
- 12 Verify that the LED's do flash.
- 13 Adjust signal generator to -5 dBu, 20.400 kHz.
- 14 Verify that the LED's do flash.
- 15 Remove the signal generator and frequency counter.

ISO Test

- 1 Set DIP switch DS3 to off (two-channel, two-wire mode).
- 2 Set DIP switch DS5 to on (talk muted during ISO).
- 3 Set all TALK and LISTEN buttons to on.
- 4 Connect a 100 ohm resistor from the ISO input (J22 pin 12) to circuit common (J22 pin 10). Observe that the MIC ON LED turns on and the channel 1 and 2 TALK buttons turn off.
- 5 Remove the 100 ohm resistor across the ISO input.
- 6 Reset DIP switch DS3 to on and DS5 to off.

Remote Mic Switch Test

- 1 Set all buttons to off.
- 2 Connect a 100 ohm resistor from the remote mic switch input (J22 pin 25) to circuit common (J22 pin 10), and observe that the MIC ON LED turns on.
- 3 Remove the 100 ohm resistor.

Program Lockout Test

- 1 Set DIP switch DS4 to on (front panel setup lockout enabled).
- 2 Press and hold the CALL button for ten seconds, and verify that the MCE325 does not enter program mode.
- 3 Reset DS4 to off.

Noise Checks

- 1 Connect a 150 ohm load across the dynamic mic input (J2 pins 1 and 2).
- 2 Connect an 8 ohm load across the speaker output.
- 3 Connect 51 ohm loads across the left headphone output (J2 pins 3 & 4) and right headphone output (J2 pins 3 & 5).
- 4 Terminate each intercom channel into 200 ohms.
- 5 Set the MIC ON button to on.
- 6 Set the SPKR ON button to on.
- 7 Set all other front panel buttons to off.
- 8 Set all volume controls to minimum.

Note: Noise measurements in the following steps were made using a 30 kHz low pass filter with +20 dB of gain inserted between the AC voltmeter and the MCE325.
- 9 Set the CH 1-3 volume control to maximum. Measure noise across the left headphone output. It should measure -44 dBu or less.
- 10 Set the CH 1-3 volume control to minimum and set the CH 2-4 volume control to maximum. Measure noise across the right headphone output. It should measure -44 dBu or less.
- 11 Set the CH 2-4 volume control to minimum. Measure noise across the speaker output. The meter should read -44 dBu or less.

12 Turn on the SPKR ON button. The meter should read -38 dBu or less. Turn off the SPKR ON button.

NOTE Noise measurements in the following steps were made using a 400 Hz to 30 kHz bandpass filter with $+40$ dB of gain.

13 Turn on the MIC ON switch. Measure noise at U1 pin 1 (mic preamp out). The voltmeter should read -26 dBu or less.

14 Turn on the PANEL MIC button. The meter should read -37 dBu or less.

15 Turn all buttons off.

16 Measure noise at U12 pin 7 (program A preamp out). The voltmeter should read -51 dBu or less.

17 Measure noise at U12 pin 1 (program B preamp out). The voltmeter should read -51 dBu or less.

18 Measure noise across intercom channels 1 through 4. All should measure -50 dBu or less.

PARTS LISTS

Packaging Assembly (9000-6464-00)**Table 5.1** Reference PD6464 Drawing, Section 6

Item No.	Description	RTS Part No.
1	User Manual, MCE325 User Station	9350-6464-00
2	Label, Warning	9170-6739-00
3	Final Assy, MCE325	9010-6464-00
4	Assy, 200-ohm Termination Plug	9020-6793-00
5	Keycap, Blank	2705-0020-00
	Keycap, Printed (TALK 3)	9150-6643-09
	Keycap, Printed (TALK 4)	9150-6643-10
	Keycap, Printed (IFB 1)	9150-6643-11
	Keycap, Printed (IFB 2)	9150-6643-12
	Keycap, Printed (LISTEN 3)	9150-6643-13
	Keycap, Printed (LISTEN 4)	9150-6643-14
	Keycap, Printed (SSA 1)	9150-6643-15
	Keycap, Printed (SSA 2)	9150-6643-16
	Keycap, Printed (PAGE)	9150-6643-10
6	Keycap, Stem	4501-0064-00

Final Assembly, MCE325 (9010-6464-00)**Table 5.2** Reference AS6464 Drawing, Section 6

Item No.	Description	RTS Part No.
1	Front Panel Assy, MCE325	9020-6261-00
2	Back Panel Assy, MCE325	9020-6262-00
3	Case, MCE/MCS	9060-6260-00
4	MCE/MCS Case Screw	9160-6305-00
5	Screw, #4-40 x 1/4	1008-4081-00
6	Valox Film, 0.010" Thick	N/A
7	Rubber Stick-on Button	4501-5012-00
8	Label, Programming and FCC Notice	9170-6776-00
9	Lug, Solder, #16	1003-0003-00

Front Panel Assembly (9020-6261-00)

Table 5.3 Reference AS6261 Drawing, Section 6

Item No.	Description	RTS Part No.
1	Bezel, MCE325	9070-6261-00
2	PC Board Assy, Front Panel, MCE325	9030-6246-00
3	Bushing Adapter	9110-6273-00
5	Keycap Stem	4501-0064-00
6	Knob, Channel Volume, MCE325	2703-0033-00
7	Knob, Program Volume, MCE325	2703-0034-00
8	Lightpipe, Button Indicator	4501-0061-00
9	Connector Insert, 6-pin Female (J2)	2018-0077-00
10	Plug, Panel Microphone	4501-0063-00
11	Lightpipe, Call Indicator	4501-0062-00
12	Screw, Thread Forming	51856-003
13	Connector Housing, 3-pin (P1)	59958-003
14	Phone Jack with Metal Bushing (J28)	2013-0048-00
15	Connector Housing, 6-pin (P2)	59958-006
16	Contact, Housing	59958-200
17	Flex Cable, 0.050" Centers	2515-0013-00
20	Keycap, Printed (TALK 1)	9150-6643-01
21	Keycap, Printed (LISTEN 1)	9150-6643-02
22	Keycap, Printed (TALK 2)	9150-6643-03
23	Keycap, Printed (LISTEN 2)	9150-6643-04
24	Keycap, Printed (CALL)	9150-6643-05
25	Keycap, Printed (PANEL MIC)	9150-6643-06
26	Keycap, Printed (SPKR ON)	9150-6643-07
27	Keycap, Printed (MIC ON)	9150-6643-08

Back Panel Assembly (9020-6262-00)

Table 5.4 Reference AS6262 Drawing, Section 6

Item No.	Description	RTS Part No.
1	PC Board Assy, Main	9030-6245-00
2	Heatsink Assy	9020-6324-00
3	Panel, Rear	9080-6262-00
4	Jack, Phone, 3 conductor, double closed circuit (J27)	2013-0003-00
5	Connector Housing (P23)	57767-203
6	cord, AC Power, Gray	2504-0004-00
7	Strain Relief, Flexible	2509-0025-00
8	Fuse, 0.5A, 250V Slo-blo	50547-015
9	Fuse Cap	57074-006
10	Fuse Holder body w/mtg Nut	2802-0003-00
11	Terminal, Wire Joint, Nylon	2017-0013-00
12	Screw, #4-40 x ¼	1008-4023-00
13	Nut, Hex Kep, #4-40	1007-0001-00
15	Nut, Hex Kep, #4-40	1007-0002-00
16	Lug, Solder, #16	51378-002
17	Shrink Tubing	LP

Heatsink Assembly (9020-6324-00)

Table 5.5 Reference 9020-6324-00 Drawing, Section 6

Item No.	Description	RTS Part No.
1	Heatsink, Model MCE325	9180-6324-01
2	IC LM4752T	511386000S
3	Adj. Regulatro, 3 Terminal, LM317T	53290000
4	Insulator	57896000
5	Washer, Nylon Shoulder	1006004000
6	Washer	50013035
7	Washer, Compression	1006004100
8	Screw PH, Cross	51845040
9	Thermal Compound	51741000

Main PC Board Assembly (9030-6245-01)

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

Ref No.	Description	RTS Part No.
C1	Capacitor, EL, 100µF, 25V	51821524
C10	Capacitor, CM, 0.1µF, 50V	52676113
C100	Capacitor, Mylar, 1nF, 100V	1514R1022L
C101	Capacitor, CM, 0.1µF, 50V	52676113
C102	Capacitor, CM, 0.1µF, 50V	52676113
C103	Capacitor, EL, 10µF, 50V	51821110

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

C104	Capacitor, CM, 0.1 μ F, 50V	52676113
C105	Capacitor, EL, 100 μ F, 25V	51821524
C106	Capacitor, EL, 4.7 μ f, 25V	51821621
C107	Capacitor, EL, 4.7 μ f, 25V	51821622
C108	Capacitor, EL, 100 μ F, 25V	51821524
C109	Capacitor, EL, 1000 μ F, 25V	51821526
C11	Capacitor, CM, 0.1 μ F, 50V	52676113
C110	Capacitor, CM, 0.1 μ F, 50V	52676113
C111	Capacitor, CM, 0.1 μ F, 50V	52676113
C112	Capacitor, EL, 220 μ F, 50V	52157534
C113	Capacitor, EL, 220 μ F, 50V	52157534
C115	Capacitor, CD, 10pF, 500V	52157502
C116	Capacitor, CD, 10pF, 500V	52157502
C117	Capacitor, CD, 10pF, 500V	52157502
C118	Capacitor, CM, 0.1 μ F, 50V	52676113
C119	Capacitor, Mylar, 0.01 μ F, 50V	52719007
C12	Capacitor, EL, 10 μ F, 50V	51821110
C120	Capacitor, CD, 100pF, 100V	1501R1011L
C121	Capacitor, CD, 10pF, 500V	52157502
C122	Capacitor, CM, 0.1 μ F, 50V	52676113
C125	Capacitor, EL, 4700 μ F, 35V	1513R4784G
C126	Capacitor, CD, 0.1 μ F, 500V	1510R1042Q
C127	Capacitor, EL, 10 μ F, 50V	51821110
C128	Capacitor, EL, 10 μ F, 50V	51821110
C129	Capacitor, EL, 100 μ F, 25V	51821524
C13	Capacitor, CM, 0.1 μ F, 50V	52676113
C130	Capacitor, CM, 0.1 μ F, 50V	52676113
C131	Capacitor, EL, 10 μ F, 50V	51821110
C132	Capacitor, CM, 0.1 μ F, 50V	52676113
C133	Capacitor, EL, 100 μ F, 25V	51821524
C134	Capacitor, CM, 0.1 μ F, 50V	52676113
C135	Capacitor, EL, 22 μ F, 50V	51821640
C136	Capacitor, CM, 0.1 μ F, 50V	52676113
C137	Capacitor, CM, 0.1 μ F, 50V	52676113
C138	Capacitor, CM, 0.1 μ F, 50V	52676113
C139	Capacitor, CM, 0.1 μ F, 50V	52676113
C14	Capacitor, EL, 100 μ F, 25V	51821524
C140	Capacitor, CM, 0.1 μ F, 50V	52676113
C141	Capacitor, CM, 0.1 μ F, 50V	52676113
C142	Capacitor, EL, 4.7 μ f, 25V	51821623
C143	Capacitor, EL, 4.7 μ f, 25V	51821624
C15	Capacitor, Mylar, 150pF, 100V	52157332
C16	Capacitor, CM, 0.1 μ F, 50V	52676113
C17	Capacitor, EL, 1 μ F, 50V	51821106
C18	Capacitor, CD, 100pF, 100V	1501R1011L
C19	Capacitor, CD, 100pF, 100V	1501R1011L

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

C2	Capacitor, EL, 10 μ F, 50V	51821110
C20	Capacitor, CD, 100pF, 100V	1501R1011L
C21	Capacitor, CD, 100pF, 100V	1501R1011L
C22	Capacitor, CM, 0.1 μ F, 50V	52676113
C23	Capacitor, CD, 10pF, 500V	52157502
C24	Capacitor, CM, 0.1 μ F, 50V	52676113
C25	Capacitor, EL, 22 μ F, 50V	51821640
C26	Capacitor, EL, 47 μ F, 16V	51821068
C27	Capacitor, EL, 22 μ F, 50V	51821640
C28	Capacitor, CD, 100pF, 100V	1501R1011L
C29	Capacitor, CD, 100pF, 100V	1501R1011L
C3	Capacitor, EL, 100 μ F, 25V	51821524
C30	Capacitor, CD, 100pF, 100V	1501R1011L
C31	Capacitor, CD, 100pF, 100V	1501R1011L
C32	Capacitor, CM, 0.1 μ F, 50V	52676113
C33	Capacitor, CD, 10pF, 500V	52157502
C34	Capacitor, EL, 47 μ F, 16V	51821068
C35	Capacitor, EL, 22 μ F, 50V	51821640
C36	Capacitor, EL, 22 μ F, 50V	51821640
C37	Capacitor, CD, 100pF, 100V	1501R1011L
C38	Capacitor, CD, 100pF, 100V	1501R1011L
C39	Capacitor, CD, 100pF, 100V	1501R1011L
C4	Capacitor, CM, 1nF, 50V	52676101
C40	Capacitor, CD, 100pF, 100V	1501R1011L
C41	Capacitor, CM, 0.1 μ F, 50V	52676113
C42	Capacitor, CD, 10pF, 500V	52157502
C43	Capacitor, CM, 0.1 μ F, 50V	52676113
C44	Capacitor, EL, 22 μ F, 50V	51821640
C45	Capacitor, EL, 47 μ F, 16V	51821068
C46	Capacitor, EL, 22 μ F, 50V	51821640
C47	Capacitor, CD, 100pF, 100V	1501R1011L
C48	Capacitor, CD, 100pF, 100V	1501R1011L
C49	Capacitor, CD, 100pF, 100V	1501R1011L
C5	Capacitor, EL, 100 μ F, 25V	51821524
C50	Capacitor, CD, 100pF, 100V	1501R1011L
C51	Capacitor, CM, 0.1 μ F, 50V	52676113
C52	Capacitor, CD, 10pF, 500V	52157502
C53	Capacitor, EL, 22 μ F, 50V	51821640
C54	Capacitor, EL, 47 μ F, 16V	51821068
C55	Capacitor, EL, 22 μ F, 50V	51821640
C56	Capacitor, CM, 0.1 μ F, 50V	52676113
C57	Capacitor, EL, 22 μ F, 50V	51821640
C58	Capacitor, CM, 0.1 μ F, 50V	52676113
C59	Capacitor, CD, 100pF, 100V	1501R1011L
C6	Capacitor, CM, 1nF, 50V	52676101
C60	Capacitor, EL, 10 μ F, 50V	51821110

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

C61	Capacitor, Mylar, 1nF, 100V	1514R1022L
C62	Capacitor, EL, 10 μ F, 50V	51821110
C63	Capacitor, CD, 100pF, 100V	1501R1011L
C64	Capacitor, Mylar, 1nF, 100V	1514R1022L
C65	Capacitor, CM, 0.1 μ F, 50V	52676113
C66	Capacitor, EL, 10 μ F, 50V	51821110
C67	Capacitor, Mylar, 1nF, 100V	1514R1022L
C68	Capacitor, EL, 10 μ F, 50V	51821110
C69	Capacitor, CD, 100pF, 100V	1501R1011L
C7	Capacitor, CM, 1nF, 50V	52676101
C70	Capacitor, Mylar, 1nF, 100V	1514R1022L
C71	Capacitor, EL, 10 μ F, 50V	51821110
C72	Capacitor, Mylar, 1nF, 100V	1514R1022L
C73	Capacitor, EL, 10 μ F, 50V	51821110
C74	Capacitor, CD, 100pF, 100V	1501R1011L
C75	Capacitor, Mylar, 1nF, 100V	1514R1022L
C76	Capacitor, CM, 0.1 μ F, 50V	52676113
C77	Capacitor, EL, 10 μ F, 50V	51821110
C78	Capacitor, EL, 10 μ F, 50V	51821110
C79	Capacitor, CD, 100pF, 100V	1501R1011L
C8	Capacitor, CM, 0.1 μ F, 50V	52676113
C80	Capacitor, Mylar, 1nF, 100V	1514R1022L
C81	Capacitor, Mylar, 1nF, 100V	1514R1022L
C82	Capacitor, EL, 1 μ F, 50V	51821106
C83	Capacitor, EL, 10 μ F, 50V	51821110
C84	Capacitor, CD, 100pF, 100V	1501R1011L
C84	500PF	52157018
C85	Capacitor, CM, 0.1 μ F, 50V	52676113
C86	Capacitor, EL, 10 μ F, 50V	51821110
C87	Capacitor, EL, 10 μ F, 50V	51821110
C88	Capacitor, CM, 0.1 μ F, 50V	52676113
C89	Capacitor, EL, 10 μ F, 50V	51821110
C9	Capacitor, CM, 0.1 μ F, 50V	52676113
C90	Capacitor, EL, 10 μ F, 50V	51821110
C91	Capacitor, CM, 0.1 μ F, 50V	52676113
C92	Capacitor, Mylar, 1nF, 100V	1514R1022L
C93	Capacitor, CM, 0.1 μ F, 50V	52676113
C94	Capacitor, CM, 0.1 μ F, 50V	52676113
C95	Capacitor, EL, 10 μ F, 50V	51821110
C96	Capacitor, CM, 0.1 μ F, 50V	52676113
C97	Capacitor, EL, 100 μ F, 25V	51821524
C98	Capacitor, CM, 0.1 μ F, 50V	52676113
C99	Capacitor, CM, 0.1 μ F, 50V	52676113
CR1	Bridge Rectifier, 4A, 50VRMS	1601097000
D1	Diode, 1N4004	50745005T
D10	Diode, 1N4004	50745005T

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

D11	Diode, 1N4004	50745005T
D12	Diode, 1N4004	50745005T
D13	Diode, 1N4004	50745005T
D14	Diode, 1N914B	160109140B
D15	Diode, 1N914B	160109140B
D16	Diode, 1N914B	160109140B
D2	Diode, 1N914B	160109140B
D20	Diode, 1N4004	50745005T
D21	Diode, 1N4004	50745005T
D22	Diode, 1N4004	50745005T
D3	Diode, 1N914B	160109140B
D4	Diode, 1N914B	160109140B
D5	Diode, 1N914B	160109140B
D6	Diode, 1N4004	50745005T
D7	Diode, 1N4004	50745005T
D8	Diode, 1N4004	50745005T
D9	Diode, 1N4004	50745005T
FB1	#73 SHIELD BEAD	2404000100
FB2	#73 SHIELD BEAD	2404000100
FB3	#73 SHIELD BEAD	2404000100
FB4	#73 SHIELD BEAD	2404000100
J1	Connector, 3-pin	59958103
J10	Connector, Audio	59893001
J14	Jack, PC Mt., 3/8	2013004900
J15	Jack, PC Mt., 3/8	2013004900
J16	Header, 3-pin	2007009900
J17	Header, 3-pin	2007009900
J18	Header, 3-pin	2007009900
J19	Header, 4-pin	2007013400
J2	Connector, 6-pin	59958106
J20	Header, 4-pin	2007013400
J21	Connector	2006009600
J22	Connector, D-Sub, 25-pin	2004004000
J23	Header, 3-pin	2007011800
J24	Header, 3-pin	2007009900
J3	Jack, PC Mt., 3/8	2013004900
J4	Header, 3-pin	2007009900
J5	Header, 3-pin	2007009900
J6	Header, 3-pin	2007009900
J7	Header, 3-pin	2007009900
J8	Connector, Audio	59893001
J9	Connector, Audio	59892001
Q1	Transistor, 2N5087	1602508700
Q10	Transistor, 2N5460	1602546000
Q2	Transistor, 2N5210	1602521000
Q3	Transistor, 2N5484	1602548400

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

Q4	Transistor, 2N5210	1602521000
Q5	Transistor, 2N5210	1602521000
R1	Resistor, CF, 1K Ohm, 5%, 1/8W	52154060
R10	Resistor, MF, 3.01K Ohm, 1%, 1/8W	54034301
R100	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R101	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R104	Trimpot, 10K Ohm, Linear	1409006000
R105	Resistor, MF, 60.4K Ohm, 1%, 1/8W	54035604
R106	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R107	Resistor, MF, 60.4K Ohm, 1%, 1/8W	54035604
R108	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R109	Resistor, CF, 100 Ohm, 5%, 1/8W	52154084
R11	Resistor, CF, 620 Ohm, 5%, 1/8W	52154065
R110	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R117	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R118	Resistor, MF, 10K Ohm, 1%, 1/8W	54035100
R119	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R12	Resistor, CF, 1K Ohm, 5%, 1/8W	52154060
R120	Resistor, MF, 10K Ohm, 1%, 1/8W	54035100
R124	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R125	Resistor, MF, 10K Ohm, 1%, 1/8W	54035100
R126	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R127	Resistor, MF, 10K Ohm, 1%, 1/8W	54035100
R13	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R130	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R131	Resistor, MF, 10K Ohm, 1%, 1/8W	54035100
R132	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R133	Resistor, MF, 10K Ohm, 1%, 1/8W	54035100
R135	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R138	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R139	Resistor, MF, 10K Ohm, 1%, 1/8W	54035100
R14	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R140	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R141	Resistor, MF, 10K Ohm, 1%, 1/8W	54035100
R142	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R15	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R152	Resistor, CF, 200 Ohm, 5%, 1/8W	52154077
R153	Resistor, CF, 220K Ohm, 5%, 1/8W	52154004
R153	160K	52154007
R154	Resistor, CF, 47K Ohm, 5%, 1/8W	52154020
R155	Resistor, CF, 47K Ohm, 5%, 1/8W	52154020
R156	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R156	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R157	Trimpot, 20K Ohm, Linear	57148407
R16	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R17	Resistor, CF, 100 Ohm, 5%, 1/4W	52154305

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

R170	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R171	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R172	Resistor, MF, 201 Ohm, 1%, 1/8W	54032301
R173	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R174	Resistor, MF, 201 Ohm, 1%, 1/8W	54032301
R175	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R176	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R177	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R178	Resistor, CF, 1M Ohm, 5%, 1/8W	52154988
R18	Resistor, CF, 100 Ohm, 5%, 1/4W	52154305
R180	Resistor, CF, 1K Ohm, 5%, 1/8W	52154060
R181	Resistor, CF, 2.7 Ohm, 5%, 1/8W	52154122
R182	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R183	Resistor, CF, 10 Ohm, 5%, 1/8W	52154108
R184	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R185	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R186	Resistor, CF, 1K Ohm, 5%, 1/8W	52154060
R187	Resistor, CF, 2.7 Ohm, 5%, 1/8W	52154122
R188	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R189	Resistor, CF, 10 Ohm, 5%, 1/8W	52154108
R19	Resistor, CF, 620 Ohm, 5%, 1/8W	52154065
R198	Resistor, CF, 270K Ohm, 5%, 1/8W	52154002
R199	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R2	Resistor, Cf, 2K Ohm, 5%, 1/8W	52154053
R20	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R200	Resistor, CF, 2.2M Ohm, 5%, 1/8W	52154980
R201	Resistor, MF, 3.01K Ohm, 1%, 1/8W	54034301
R207	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R208	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R209	Resistor, CF, 1K Ohm, 5%, 1/8W	52154060
R21	Resistor, CF, 47K Ohm, 5%, 1/8W	52154020
R211	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R212	Resistor, CF, 270K Ohm, 5%, 1/8W	52154002
R213	Resistor, CF, 270K Ohm, 5%, 1/8W	52154002
R214	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R215	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R22	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R23	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R24	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R26	Resistor, CF, 5.1M Ohm, 5%, 1/8W	52154698
R261	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R262	Resistor, MF, 3.01K Ohm, 1%, 1/8W	54034301
R263	Resistor, MF, 201 Ohm, 1%, 1/8W	54032301
R264	Resistor, CF, 220K Ohm, 5%, 1/8W	52154004
R265	Resistor, CF, 220K Ohm, 5%, 1/8W	52154004
R266	Resistor, MF, 909 Ohm, 1%, 1/8W	54032909

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

R267	Resistor, MF, 201 Ohm, 1%, 1/8W	54032301
R268	Resistor, CF, 200 Ohm, 5%, 1/8W	52154077
R269	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R27	Resistor, CF, 200 Ohm, 5%, 1/8W	52154077
R28	Resistor, CF, 22K Ohm, 5%, 1/8W	52154010
R29	Resistor, CF, 5.1M Ohm, 5%, 1/8W	52154698
R3	Resistor, CF, 100 Ohm, 5%, 1/8W	52154084
R30	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R31	Resistor, CF, 5.1M Ohm, 5%, 1/8W	52154698
R32	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R33	Resistor, CF, 15K Ohm, 5%, 1/8W	52154032
R34	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R35	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R36	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R37	Trimpot, 10K Ohm, w/knob	57148406
R38	Resistor, CF, 100 Ohm, 5%, 1/8W	52154084
R39	Resistor, Cf, 2K Ohm, 5%, 1/8W	52154053
R4	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R40	Resistor, CF, 30K Ohm, 5%, 1/8W	52154025
R41	Resistor, CF, 470K Ohm, 5%, 1/8W	52154996
R42	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R43	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R44	Resistor, CF, 2.7 Ohm, 5%, 1/8W	52154122
R45	Resistor, CF, 2.7 Ohm, 5%, 1/8W	52154122
R46	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R47	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R48	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R49	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R5	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R50	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R51	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R52	Resistor, CF, 47K Ohm, 5%, 1/8W	52154020
R53	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R54	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R55	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R57	Trimpot, 10K Ohm, Linear	1409006000
R58	Resistor, MF, 60.4K Ohm, 1%, 1/8W	54035604
R59	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R6	Resistor, CF, 1K Ohm, 5%, 1/8W	52154060
R60	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R61	Resistor, MF, 60.4K Ohm, 1%, 1/8W	54035604
R62	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R63	Resistor, CF, 100 Ohm, 5%, 1/8W	52154084
R64	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R65	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R66	Resistor, CF, 47K Ohm, 5%, 1/8W	52154020

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

R67	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R68	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R69	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R7	Resistor, MF, 301 Ohm, 1%, 1/8W	54034150
R70	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R73	Trimpot, 10K Ohm, Linear	1409006000
R74	Resistor, MF, 60.4K Ohm, 1%, 1/8W	54035604
R75	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R76	Resistor, MF, 60.4K Ohm, 1%, 1/8W	54035604
R77	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R78	Resistor, CF, 100 Ohm, 5%, 1/8W	52154084
R79	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R8	Resistor, MF, 301 Ohm, 1%, 1/8W	54034150
R80	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R81	Resistor, CF, 47K Ohm, 5%, 1/8W	52154020
R82	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R83	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R84	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R85	Resistor, CF, 10K Ohm, 5%, 1/8W	52154036
R88	Trimpot, 10K Ohm, Linear	1409006000
R89	Resistor, MF, 60.4K Ohm, 1%, 1/8W	54035604
R9	Resistor, MF, 301 Ohm, 1%, 1/8W	54034150
R90	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R91	Resistor, MF, 60.4K Ohm, 1%, 1/8W	54035604
R92	Resistor, MF, 20K Ohm, 1%, 1/8W	54035200
R94	Resistor, CF, 100 Ohm, 5%, 1/8W	52154084
R95	Resistor, CF, 100K Ohm, 5% 1/8W	52154012
R96	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R97	Resistor, CF, 47K Ohm, 5%, 1/8W	52154020
R98	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
R99	Resistor, CF, 22K Ohm, 5%, 1/8W	524154028
RP1	Resistor Network, 100K Ohm X4, No Common, 1.1W	1411100302
RP10	Resistor Network, 100K Ohm X4, No Common, 1.1W	1411100302
RP11	Resistor Network, 100K Ohm X4, No Common, 1.1W	1411100302
RP12	Resistor Network, 100K Ohm X4, No Common, 1.1W	1411100302
RP14	Resistor Network, 680 Ohm X 5, No Common, 1.5W	1411680000
RP15	Resistor Network, 680 Ohm X 5, No Common, 1.5W	1411680000
RP2	Resistor Network, 22K Ohm X 9, Pin 1 Common, 1.5W	1411220201
RP3	Resistor Network, 100K Ohm X4, No Common, 1.1W	1411100302
RP5	Resistor Network, 22K Ohm X 9, Pin 1 Common, 1.5W	1411220201
RP6	Resistor Network, 10K Ohm X 4, Pin 1 Common, 0.9W	1411100204
RP7	Resistor Network, 10K Ohm X 4, Pin 1 Common, 0.9W	1411100204
RP8	Resistor Network, 22K Ohm X 9, Pin 1 Common, 1.5W	1411220201
RP9	Resistor Network, 22K Ohm X 9, Pin 1 Common, 1.5W	1411220201
S1	Switch, DIP, Low Profile	1909000200
T1	R-Core XFMR	9020653400

Table 5.6 Reference 9027-6245-01 Drawing, Section 6

U1	IC, Dual Low-noise Op-Amp, NE5532N	53295000
U10	IC, Dual Low-noise Op-Amp, NE5532N	53295000
U11	IC, Dual Low-noise Op-Amp, TLO76	1603013500
U12	IC, Dual Low-noise Op-Amp, TLO77	1603013500
U13	IC, Analog Switch, CD4053BE	46638P1
U14	IC, Analog Switch, CD4053BE	46638P1
U15	IC, Analog Switch, CD4053BE	46638P1
U16	IC, Dual Low-noise Op-Amp, TLO78	1603013500
U17	IC, Dual Low-noise Op-Amp, NE5532N	53295000
U18	IC, Audio Amp, LM386	53281000
U19	IC, Audio Amp, LM387	53281000
U2	IC, Analog Switch, CD4053BE	46638P1
U20	IC, Reference, LM833	1603083300
U21	IC, Analog Switch, CD4053BE	46638P1
U22	IC, Undervoltage Sense, MC33064P-5	1603013700
U23	IC, UCN5821A	160358210A
U24	IC, UCN5821A	160358210A
U25	IC, UCN5821A	160358210A
U27	IC, Voltage Regulator, LM317	53290000
U28	IC, EEPROM, 1024 Bit, 93C56AN NA	1603013800
U29	Assy. Software, Version 1.6	9020634816
U3	IC, Analog Switch, CD4053BE	46638P1
U30	IC, Quad 2-input NAND, 4093B	160340930B
U4	IC, Analog Switch, CD4053BE	46638P1
U5	IC, Dual Low-noise Op-Amp, TLO72	1603013500
U6	IC, Dual Low-noise Op-Amp, TLO73	1603013500
U7	IC, Dual Low-noise Op-Amp, TLO74	1603013500
U8	IC, Dual Low-noise Op-Amp, TLO75	1603013500
U9	IC, Dual Low-noise Op-Amp, NE5532N	53295000
XJ16	Jumper	2515001001
XJ17	Jumper	2515001001
XJ18	Jumper	2515001001
XJ19	Jumper	2515001001
XJ20	Jumper	2515001001
XJ24	Jumper	2515001001
XJ4	Jumper	2515001001
XJ5	Jumper	2515001001
XJ6	Jumper	2515001001
XJ7	Jumper	2515001001
XU1	IC Socket, 8-Pin	53041002
XU29	IC Socket, 40-Pin	53041308
Y1	Crystal, 4MHz, 20pF	3301000700
	WASHER FLAT	52186006
	4-40X1/4	1008402300
	4-40X3/8	1008403500

PC Board Assembly, Front Panel (9030-6246-00)

Table 5.7 Reference AS6246 Drawing, Section 6

Ref No.	Description	RTS Part No.
R1-R3	Pot, 10K Ohm, Audio	1406003901
DS9	LED, Super Bright, Red	1801001900
DS1-DS8	LED, Super Bright, Yellow	1801002200
S1-S8	Keyswitch, No LED	1911004300
J1	Connector	2006009600

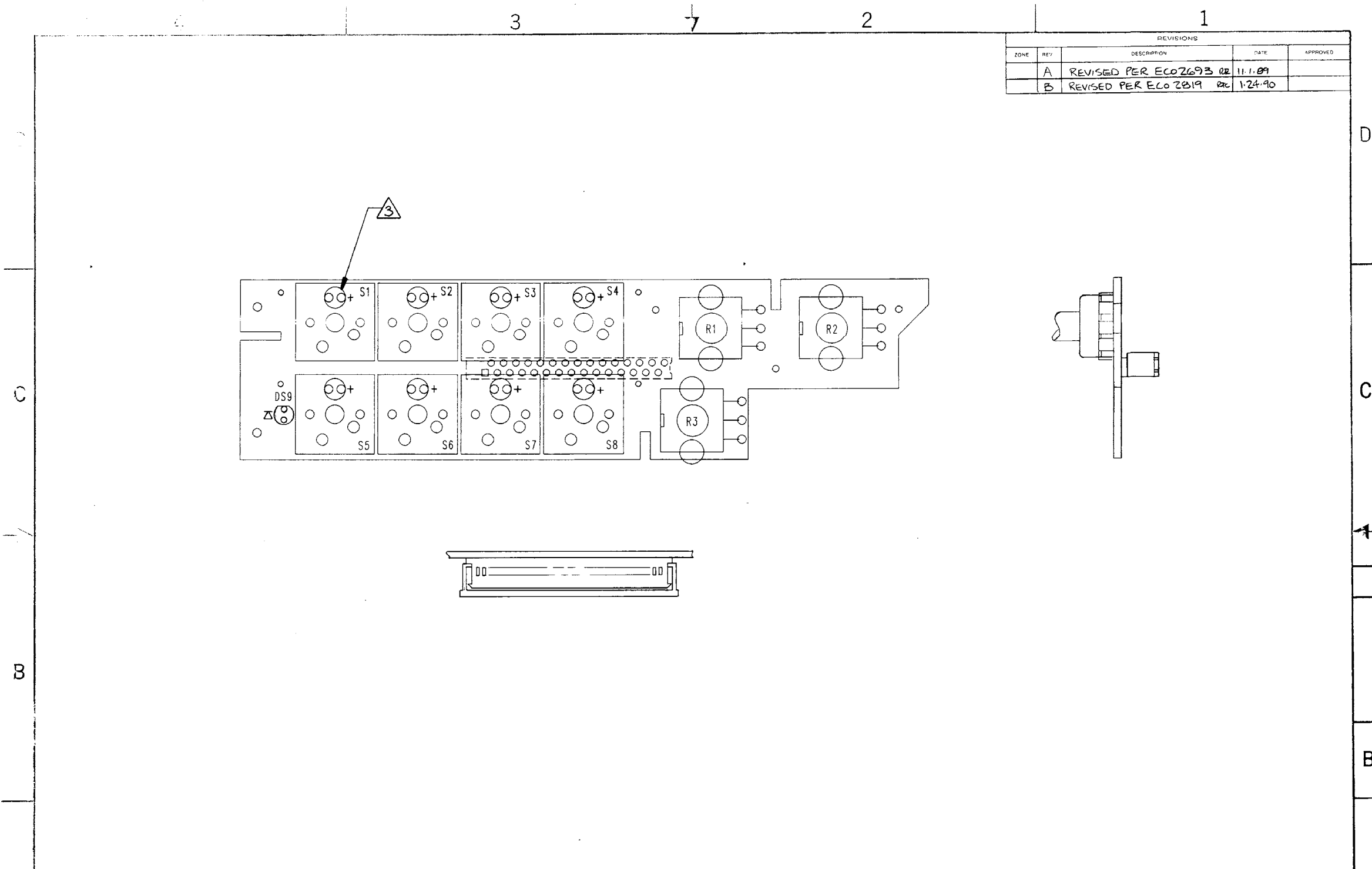
SECTION

6

DIAGRAMS

AS6246
 ASSY PCB FRONT PANEL BOARD MCE325

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	REVISED PER ECO 2693 02	11.1.89	
	B	REVISED PER ECO 2819 02	1.24.90	



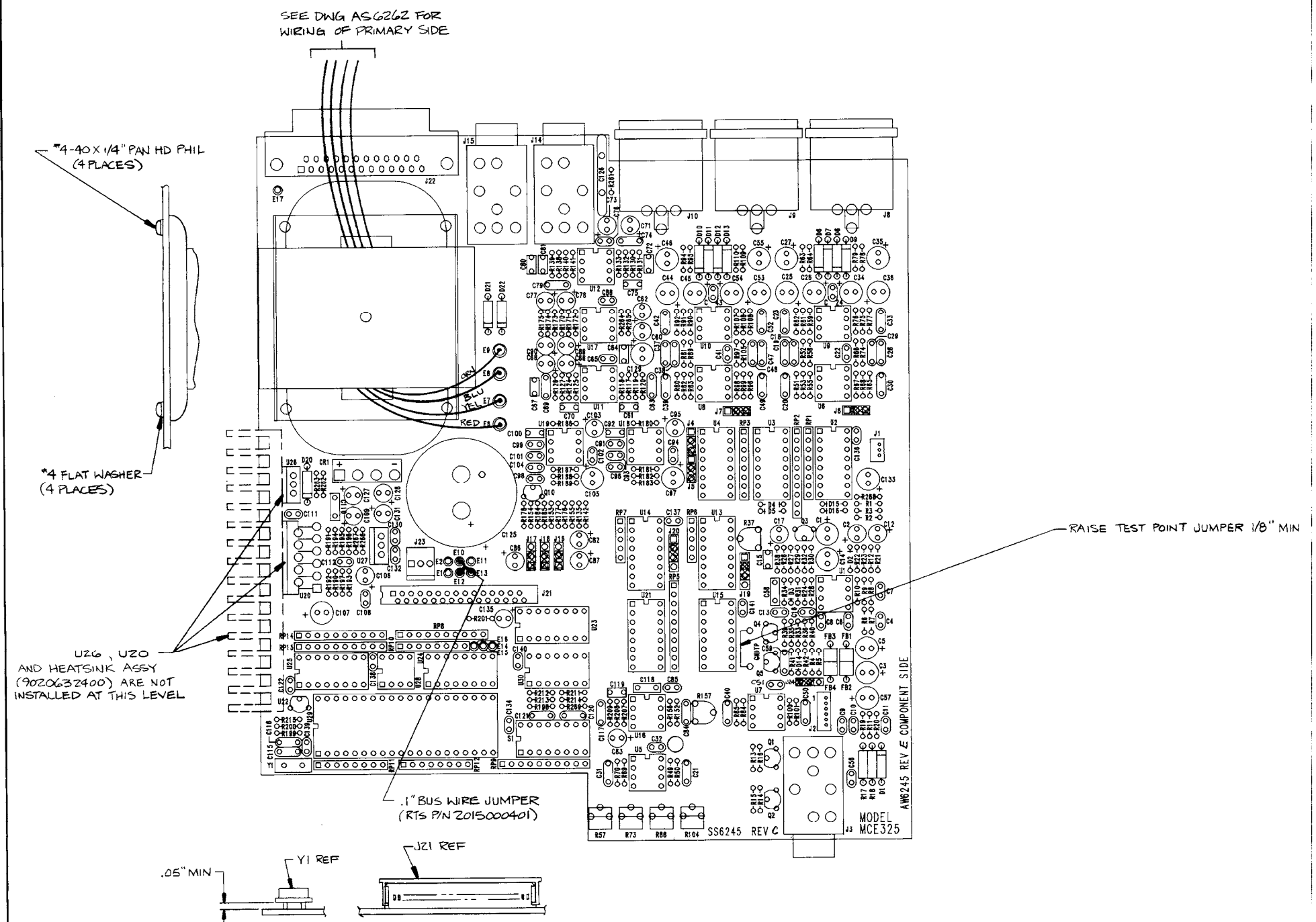
- 3** INSTALL LED (9 PLACES) WITH THE ANODE (LONGER LEAD) ON THE "+" SIDE.
- 2.** SEE SCHEMATIC DIAGRAM SD6246.
- 1.** POTS (R1, R2 & R3) MUST BE FULLY INSERTED.

NOTES: UNLESS OTHERWISE SPECIFIED

SEE SEPARATE PARTS LIST 9030624600

UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS & BREAK SHARP EDGES HOLE TOLERANCES PER ANSI B31.1-1987, B19.2 DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± 1/16 ± .006 ± 30'		CONTRACT NO.		RTS SYSTEMS BURBANK, CALIFORNIA	
APPROVALS		DATE		ASSEMBLY, PCB, FRONT PANEL BOARD, MCE325	
DRAWN R.T. CRUZ		3-27-89		SIZE	FSCM NO.
CHECKED GM		3-28-89		C	60572
ISSUED				DWG. NO.	AS6246
NEXT ASSY		USED ON		REV.	B
APPLICATION		DO NOT SCALE DRAWING		SCALE	2/1
				SHEET	1 of 1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	ADDED .1 BUS WIRE JUMPER	RTL 1-5-90	
	B	REVISED PER ECO 2819	RTL 1-24-90	
	C	REVISED PER ECO 2917	RTL 3-27-90	GM 3/27/90
	D	REVISED PER ECO 457494	5-7-93	RT.



3. INSTALL JUMPERS ON HEADERS J4, J5, J6, J7, J16, J17, J18, J19, J20 & J24 AS SHOWN BY CROSSHATCHED SECTIONS.
2. DO NOT USE ANY ADHESIVE SUCH AS GLYPOL ON ANY TRIM POTS (R57, R73, R88, R104, R37, R157).
1. SEE SCHEMATIC DIAGRAM SD6245.

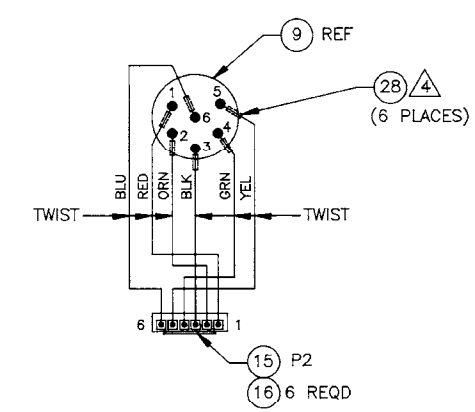
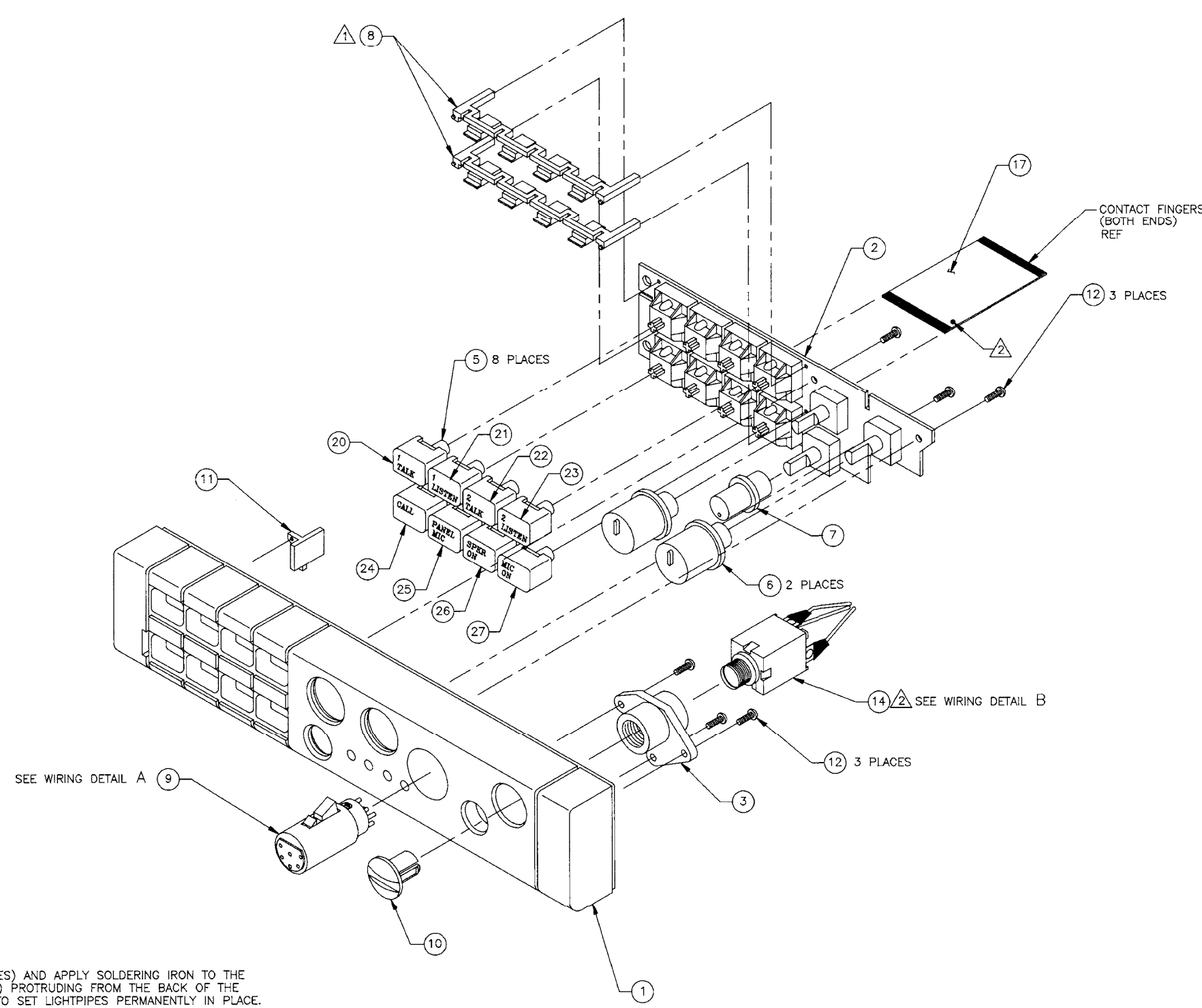
NOTES: UNLESS OTHERWISE SPECIFIED

SEE SEPARATE PARTS LIST 9030-6245-00

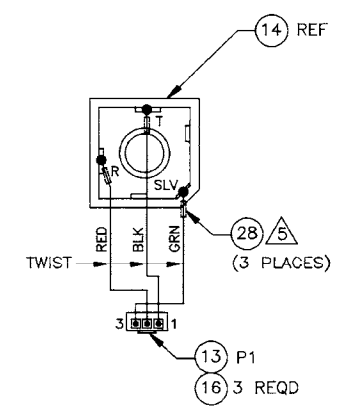
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES = .XX ± .XXX ±		CONTRACT NO.		RTS SYSTEMS BURBANK, CALIFORNIA	
APPROVALS		DATE		ASSEMBLY, P.C.B.	
DRAWN RTI, CRUZ		11-1-89		MCE325 MOTHERBOARD	
CHECKED G.M.		11-6-89		SIZE FSCM NO. DWG. NO. D 60572 AS6245	
ISSUED				SCALE 2/1 SHEET 1 OF 1	
NEXT ASSY		USED ON		APPLICATION DO NOT SCALE DRAWING	

BR. 15

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	C	REVISED PER ECO#3080	RTC 6/27/90	GM 7/12/90



WIRING DETAIL A
WIRES ARE 28AWG,
STRANDED VINYL (3" LG)



WIRING DETAIL B
WIRES ARE 28AWG,
STRANDED VINYL (5" LG)

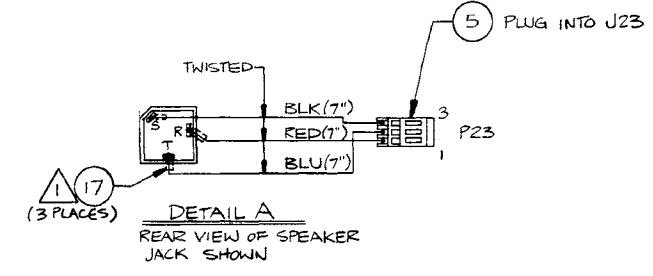
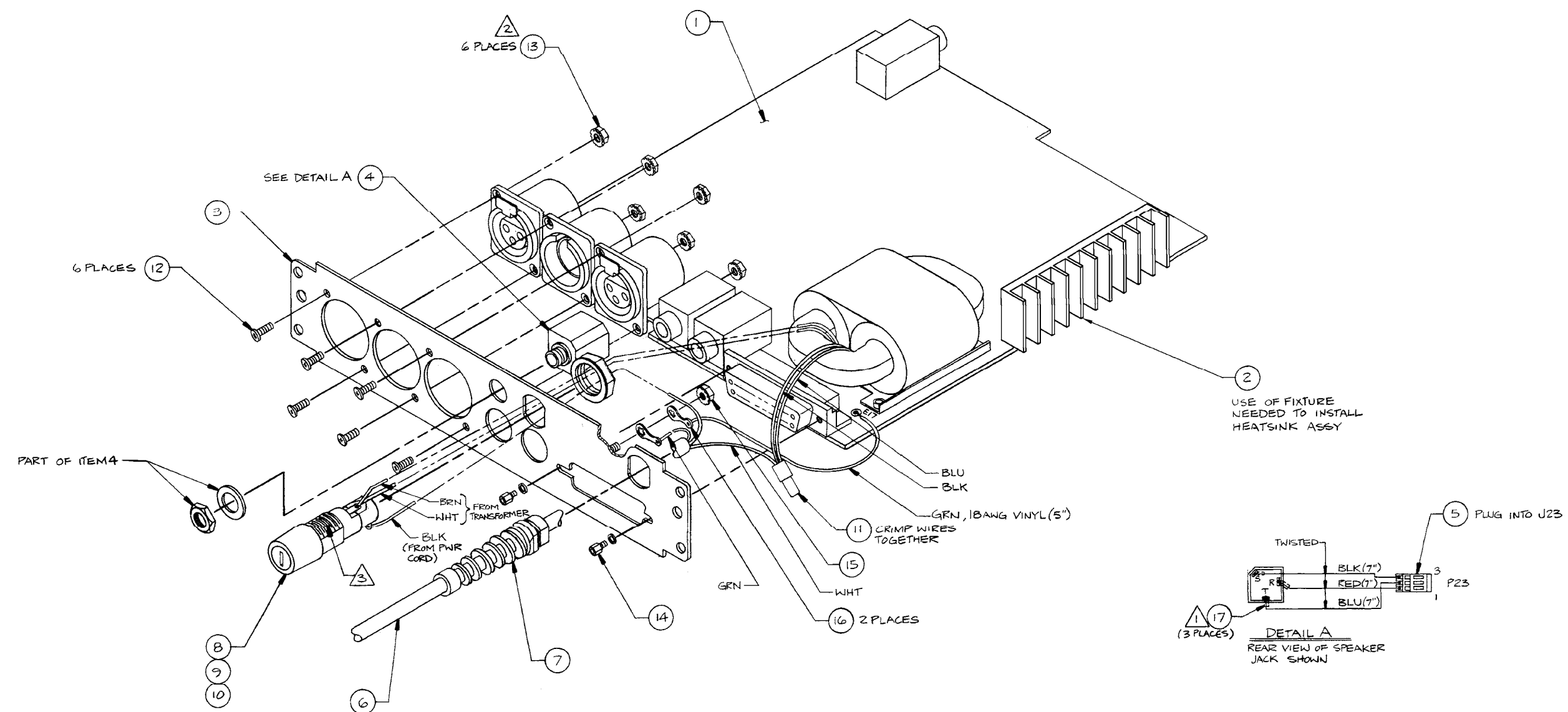
- 1 INSTALL LED LIGHTPIPE (2 PLACES) AND APPLY SOLDERING IRON TO THE GUIDING PINS (2 PER LIGHTPIPE) PROTRUDING FROM THE BACK OF THE FRONT PANEL BOARD (ITEM 2) TO SET LIGHTPIPER PERMANENTLY IN PLACE.
- 2 ADD A RED DOT TO ITEM 17 AND TO ZIF CONNECTOR ON FRONT PANEL BOARD TO INDICATE POLARITY OF THE CABLE (ITEM 17).
- 3 INSTALL TRS JACK (ITEM 14) SO THAT ONE OF ITS FOUR SIDES WILL BE PARALLEL TO THE TOP COVER WHEN TOP COVER IS INSTALLED DURING FINAL ASSY. JACK TO BE TURNED CLOCKWISE WITH A WRENCH TO BRING ONE OF IT'S SIDES PARALLEL TO TOP COVER.
- 4 ADD SHRINK SLEEVE (.25" LONG).
- 5 ADD SHRINK SLEEVE (.50" LONG).

NOTES: UNLESS OTHERWISE SPECIFIED

SEE SEPARATE PARTS LIST 9020-6261-00

UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS & BREAK SHARP EDGES HOLE TOLERANCES PER ANSI B94-11-1987, R1972 DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± 1/16 .005 ± 30'		CONTRACT NO.		RTS SYSTEMS BURBANK, CALIFORNIA, USA	
APPROVALS		DATE		ASSEMBLY DRAWING— FRONT PANEL, MCE325	
DRAWN R.T.CRUZ		11/16/89			
CHECKED GM		7/12/90			
ISSUED				SIZE FSCM NO. DWG NO. REV D 60572 AS6261 C	
NEXT ASSY USED ON		FINISH		SCALE 1/1 A6261C01.DWG SHEET 1 OF 1	
APPLICATION					

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	REVISED PER ECOZBS1 RTS PRODUCTION RELEASE	2/21/90	GM 2/21/90
	B	REVISED PER ECO*3080	6-26-90	GM 7-12-90
	C	CHG. VIEW OF ITEM 2 ECD# 73382	4-6-01	KS

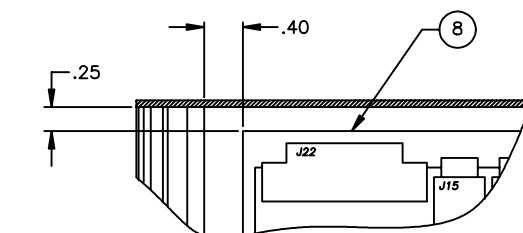
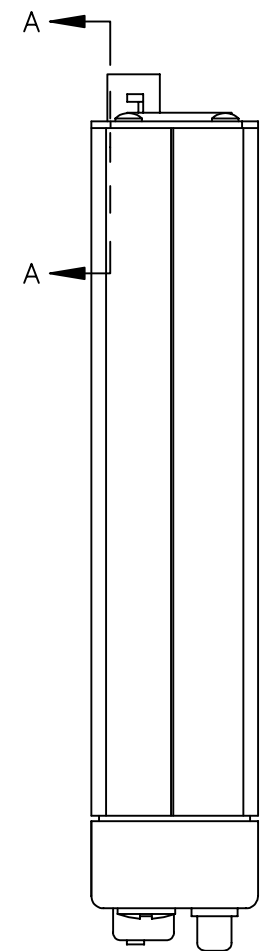
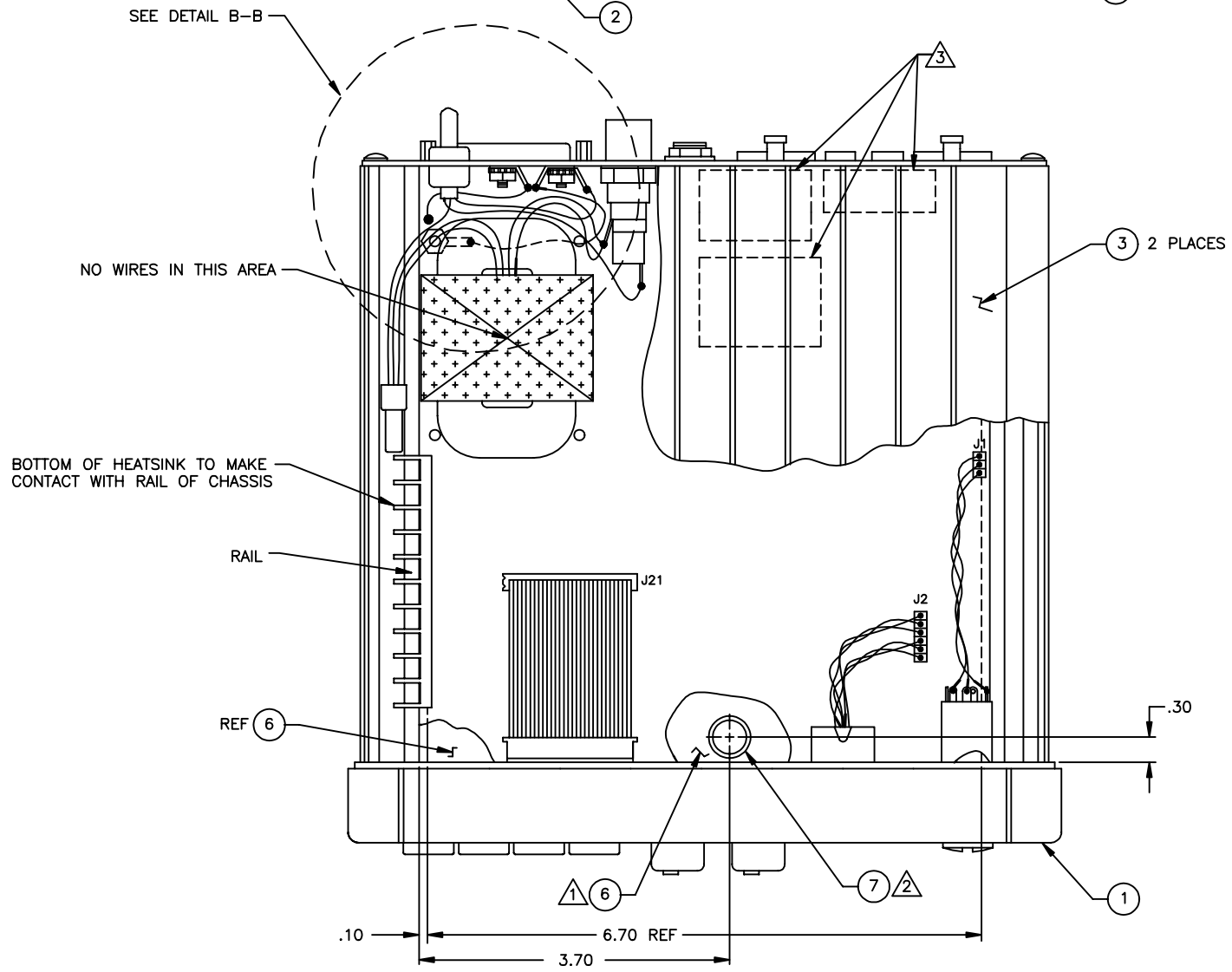
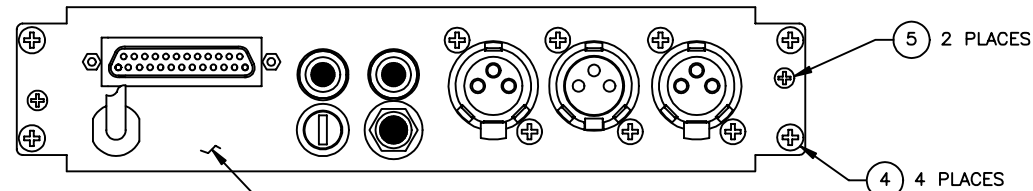


- 3 APPLY GLYPTOL (TELEX #53131-000) TO FUSE HOLDER (ITEM 10) TO PREVENT NUT FROM GETTING LOOSE.
 - 2 APPLY ADHESIVE COMPOUND (LOCKTITE # JM328) TO THREAD OF SCREWS (ITEM 12) TO PREVENT NUTS FROM GETTING LOOSE.
 - 1 ADD SHRINK SLEEVE (0.50 IN. LONG) TO WIRE CONNECTIONS.
- NOTES: UNLESS OTHERWISE SPECIFIED

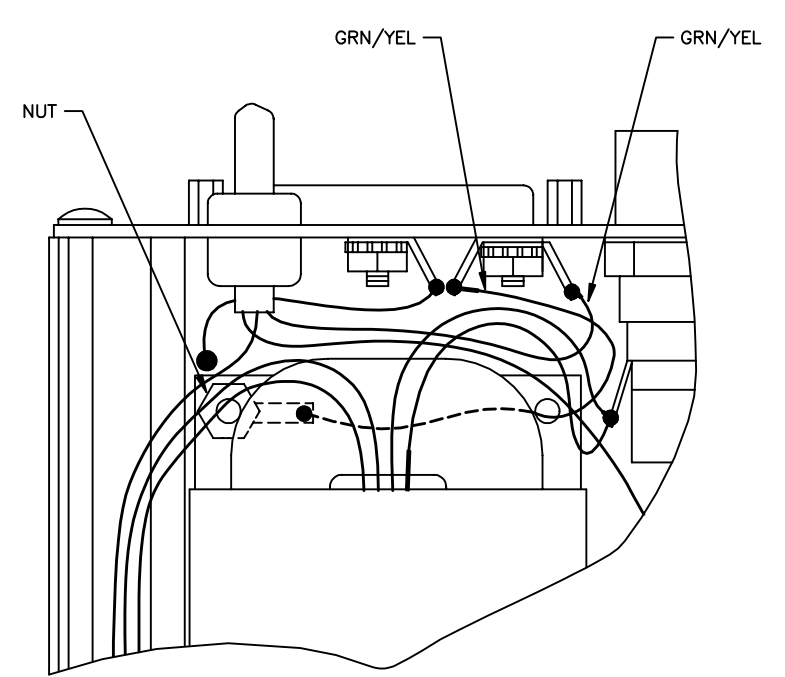
SEE SEPARATE PARTS LIST 9020-6262-00

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XXX ± ±		CONTRACT NO.		RTS SYSTEMS BURLINGAME, CALIFORNIA	
APPROVALS		DATE		ASSEMBLY DRAWING — BACK PANEL, MCE325	
DRAWN R. TORRE		11-16-89		SIZE FSCM NO. DWG. NO. REV D 60572 AS6262 B	
CHECKED G. MORALES		11-16-89		SCALE SHEET 1 OF 1	
ISSUED				LN	
DO NOT SCALE DRAWING					

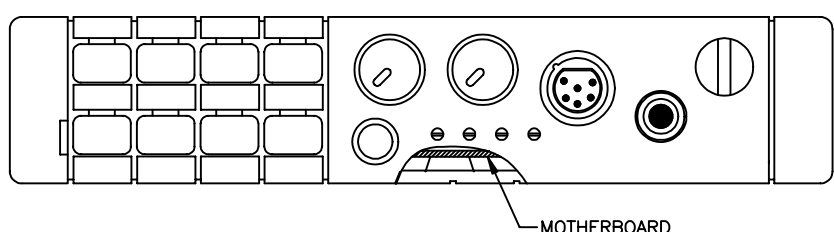
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	REVISED PER ECO#3080	RTC 6/26/90	GM 7/12/90
	B	REVISED PARTS LIST NO. PER ECO#3238	RTC 10/15/90	GM10/15/90
	C	ADDED VIEW OF TRANSFORMER PER ECO#3295	RTC 12/14/90	GM12/14/90
	D	ADD GRN/YEL WIRE & GND LUG; ADD "GRN/YEL" ADD DETAIL B-B	11-19-91	JC TAL
	E	ADD UL & MARKING LABELS; ADD NOTE 3 PER ECO#55779	6-25-92	RGP
	F	CHNG FLAG NOTE 3 ECO 61255	12-5-95	JC
	G	CHG. VIEW OF HEATSINK P/N 91806324-01 SHOWN WAS: P/N 91806324-00; ADD HEATSINK AND RAIL CALLOUTS ECO# 73382	4-6-01	KS



VIEW A-A



DETAIL B-B
SCALE 2:1

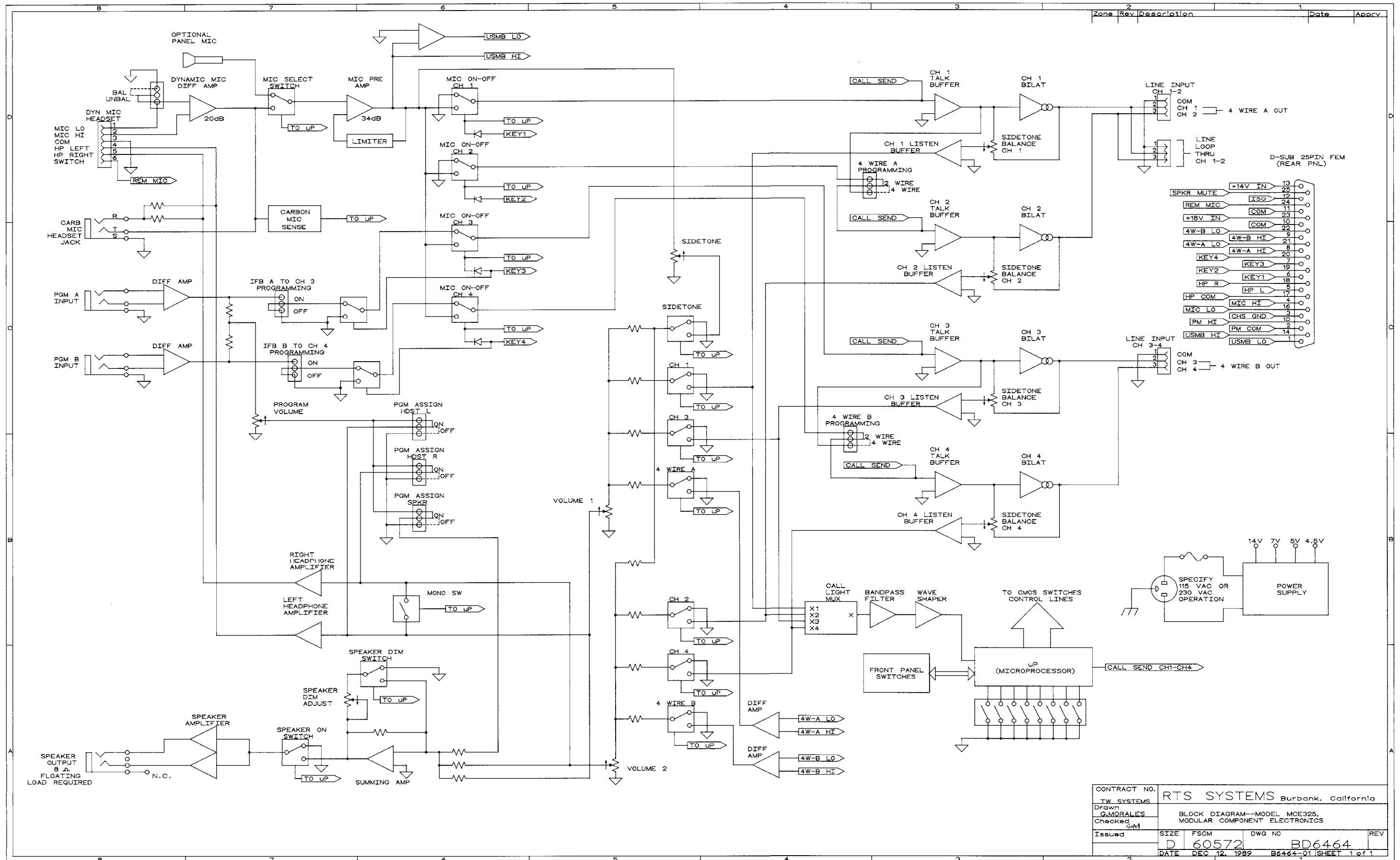


SEE SEPARATE PARTS LIST: 9010-6464-00 (110VAC)
9010-6464-06 (220VAC)

- ③ ADD THE UL, MARKING LABEL AND WARNING LABEL ON THE BOTTOM OF THE UNIT AS SHOWN.
- ② INSTALL RUBBER BUMPER (ITEM 17) APPROX AS SHOWN, BEFORE SLIDING THE REAR PANEL ASSY (ITEM 2) FORWARD.
- ① CUT A 7.0" X 6.7" PIECE OF MYLAR FROM ITEM 6 AND ADHERE TO BOTTOM CASE (ITEM 3).

NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS & BREAK SHARP EDGES HOLE TOLERANCES PER ANSI B94.11-1967, R1972 DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ±1/16 .X ±.060 ±0.30° XX ±.030 XXX±.010		CONTRACT NO.		RTS SYSTEMS BURBANK, CALIFORNIA, USA	
APPROVALS		DATE		FINAL ASSEMBLY- PROGRAMMABLE USER STATION, MODEL MCE325	
DRAWN R.T.CRUZ		2/5/90			
CHECKED G.M.		7/12/90			
ISSUED		SIZE FSCM NO.		DWG NO.	
NEXT ASSY		USED ON		D160572 AS6464	
APPLICATION		FINISH		SCALE 1/1 AS6464G01.DWG SHEET 1 OF 1	

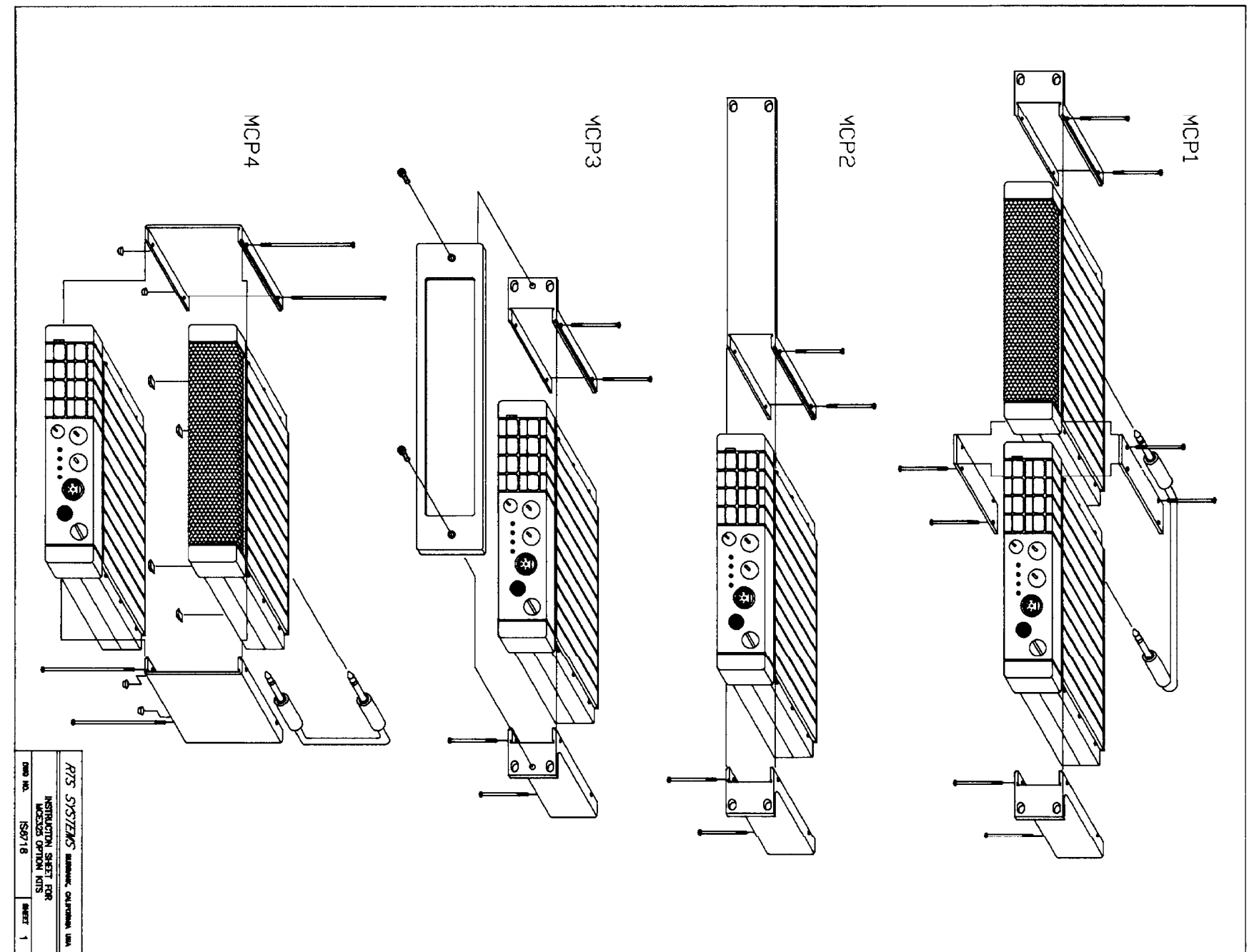


CONTRACT NO.	RTS SYSTEMS Burbank, California		
TW SYSTEMS	BLOCK DIAGRAM--MODEL MCE325, MODULAR COMPONENT ELECTRONICS		
Drawn G. MORALES	SIZE	FSCM	DWG NO
Checked SM	D	60572	BD6464
Issued	DATE	DEC 12, 1992	B6464-01 SHEET 1 of 1

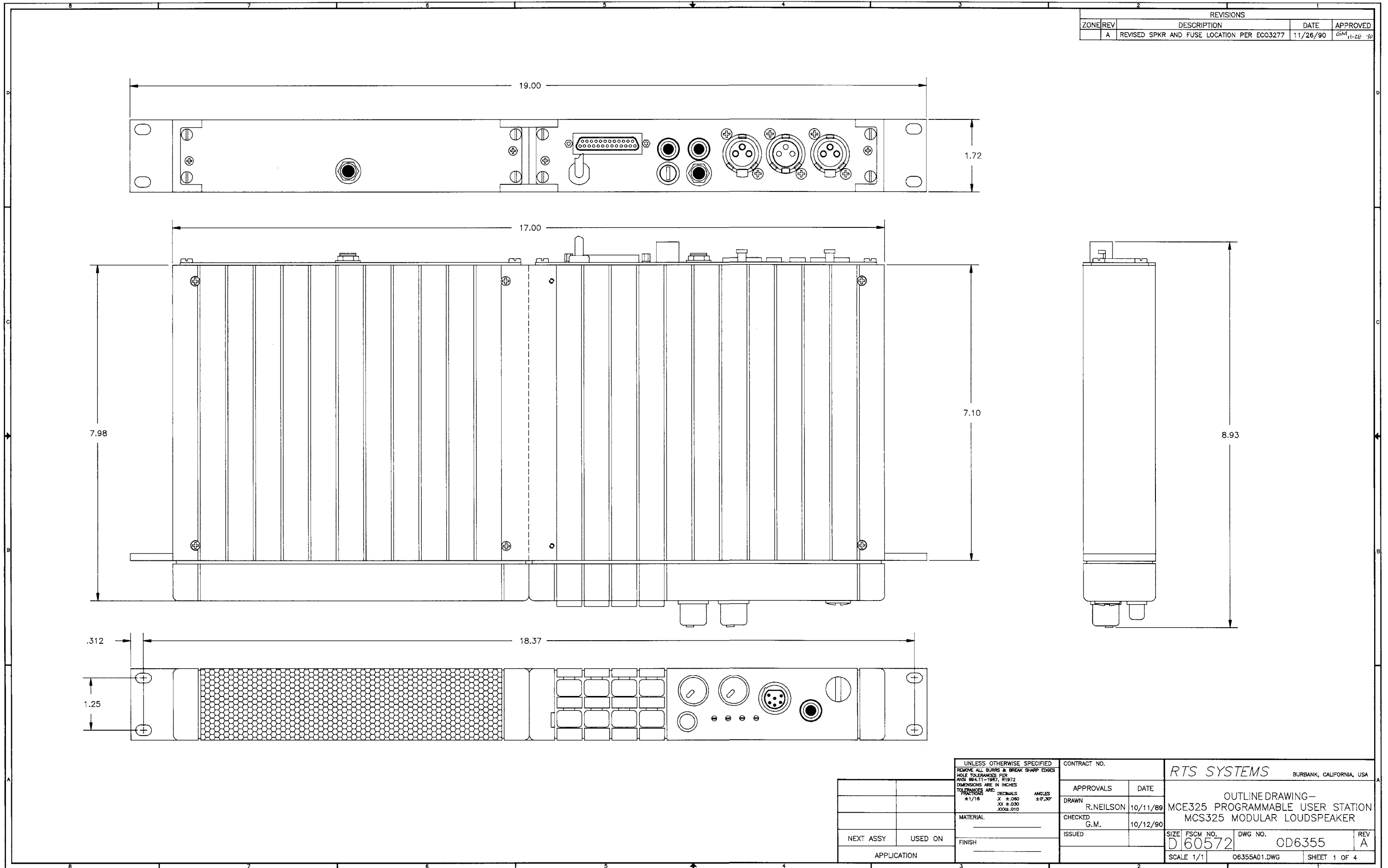
REV. FILE COPY, ITEM NO. 07100

IS6718

INSTRUCTION SHEET FOR MCP325 OPT KITS



R/S SYSTEMS, INC. MILWAUKEE, WISCONSIN, USA
 INSTRUCTION SHEET FOR
 MCP325 OPTION KITS
 FORM NO. IS6718 SHEET 1



REVISIONS			
ZONE	REV	DESCRIPTION	DATE
	A	REVISED SPKR AND FUSE LOCATION PER ECO3277	11/26/90

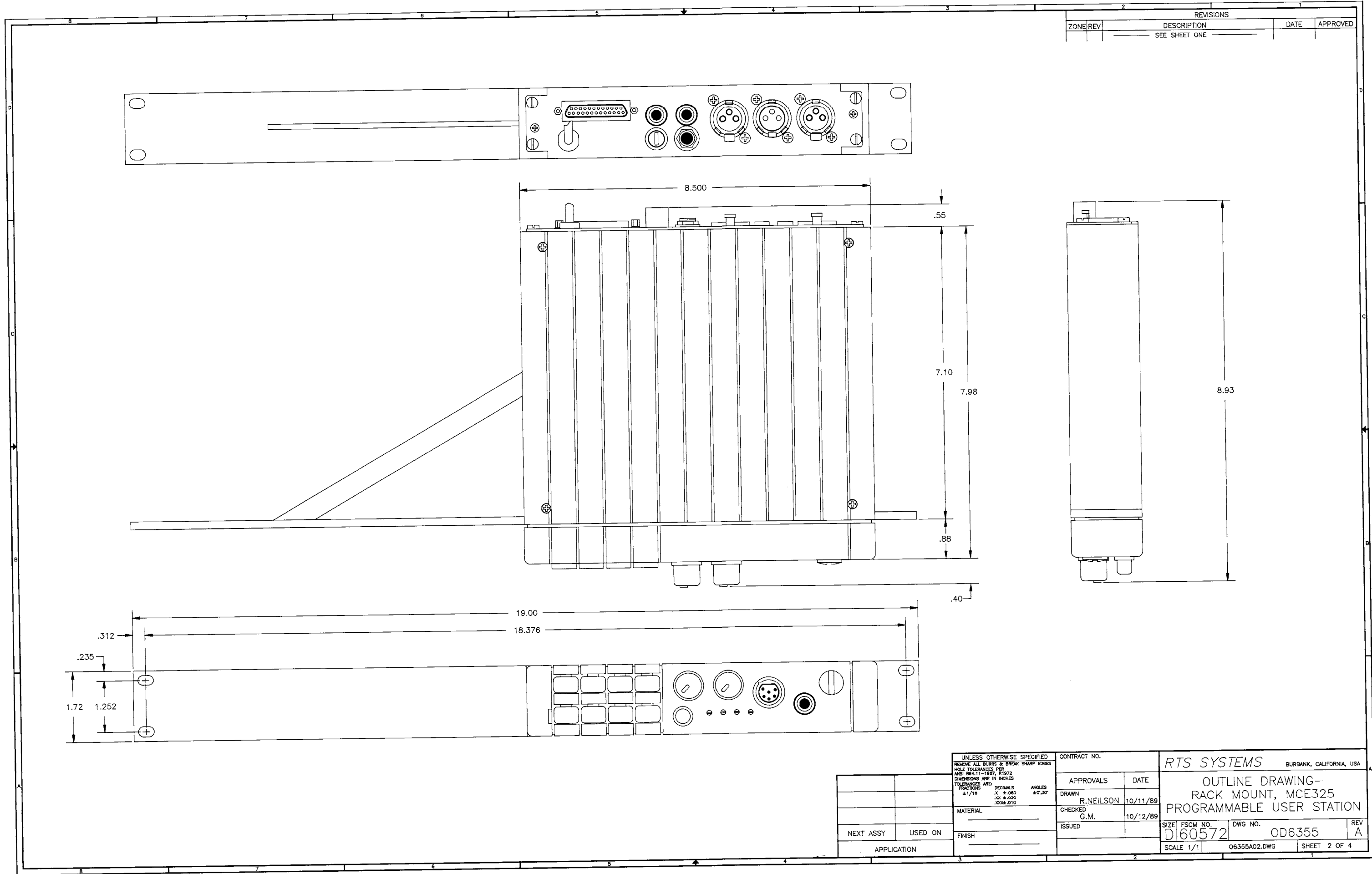
UNLESS OTHERWISE SPECIFIED
 REMOVE ALL BURRS & BREAK SHARP EDGES
 HOLE TOLERANCES PER
 ANSI B94.11-1987, R1972
 DIMENSIONS ARE IN INCHES
 TOLERANCES ARE:
 DECIMALS .XX ±.030
 FRACTIONS ±1/16
 ANGLES ±0.30°

CONTRACT NO.	
APPROVALS	DATE
DRAWN R.NEILSON	10/11/89
CHECKED G.M.	10/12/90
ISSUED	

RTS SYSTEMS
 BURBANK, CALIFORNIA, USA
 OUTLINE DRAWING—
 MCE325 PROGRAMMABLE USER STATION
 MCS325 MODULAR LOUDSPEAKER

NEXT ASSY	USED ON
APPLICATION	

SIZE	FSCM NO.	DWG NO.	REV
D	60572	OD6355	A
SCALE	SHEET		OF
1/1	1		4



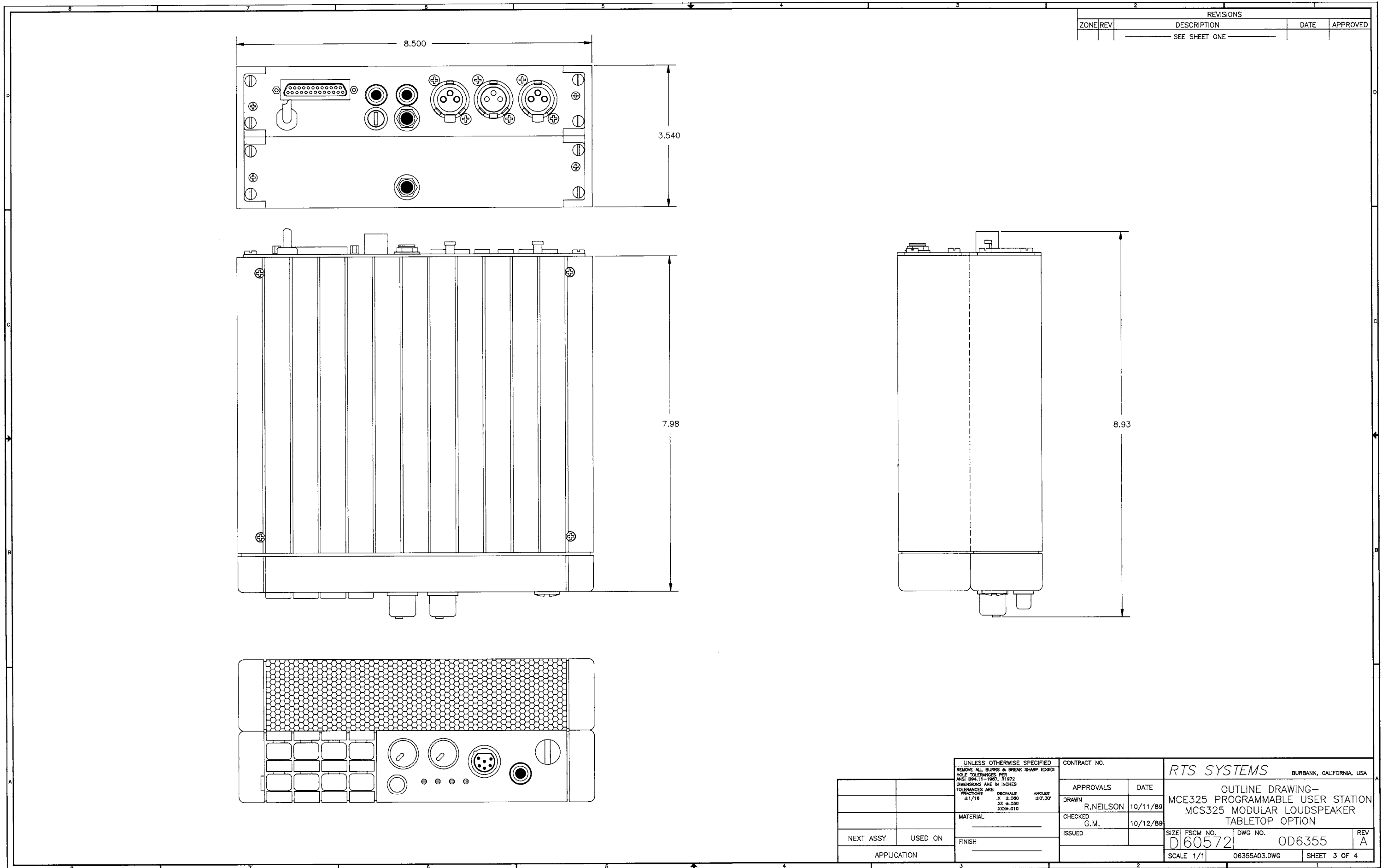
ZONE		REV		REVISIONS		DATE	APPROVED
				DESCRIPTION			
				SEE SHEET ONE			

UNLESS OTHERWISE SPECIFIED
 REMOVE ALL BURRS & BREAK SWAMP EDGES
 HOLE TOLERANCES PER
 ANSI B94.11-1987, R1972
 DIMENSIONS ARE IN INCHES
 TOLERANCES ARE:
 FRACTIONS: ±1/16
 DECIMALS: X ±.080
 .XX ±.030
 .XXX ±.010
 ANGLES: ±0.30°

NEXT ASSY	USED ON
APPLICATION	

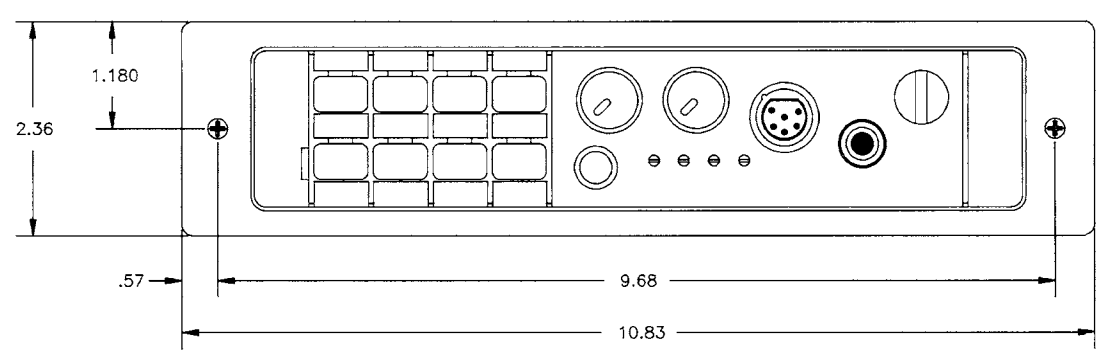
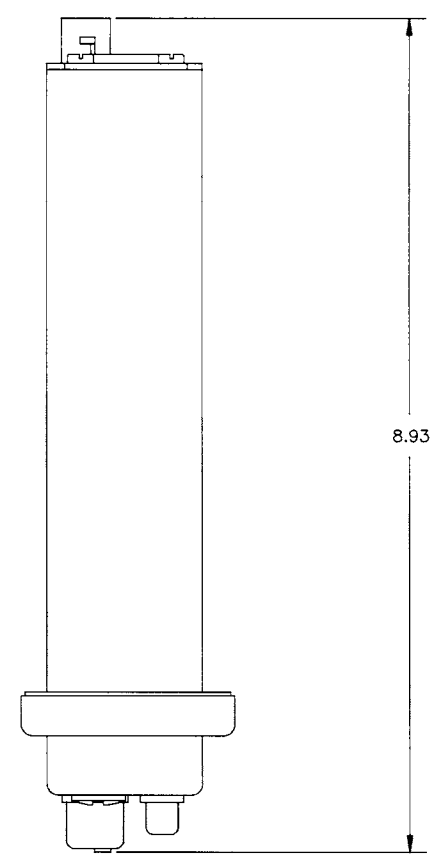
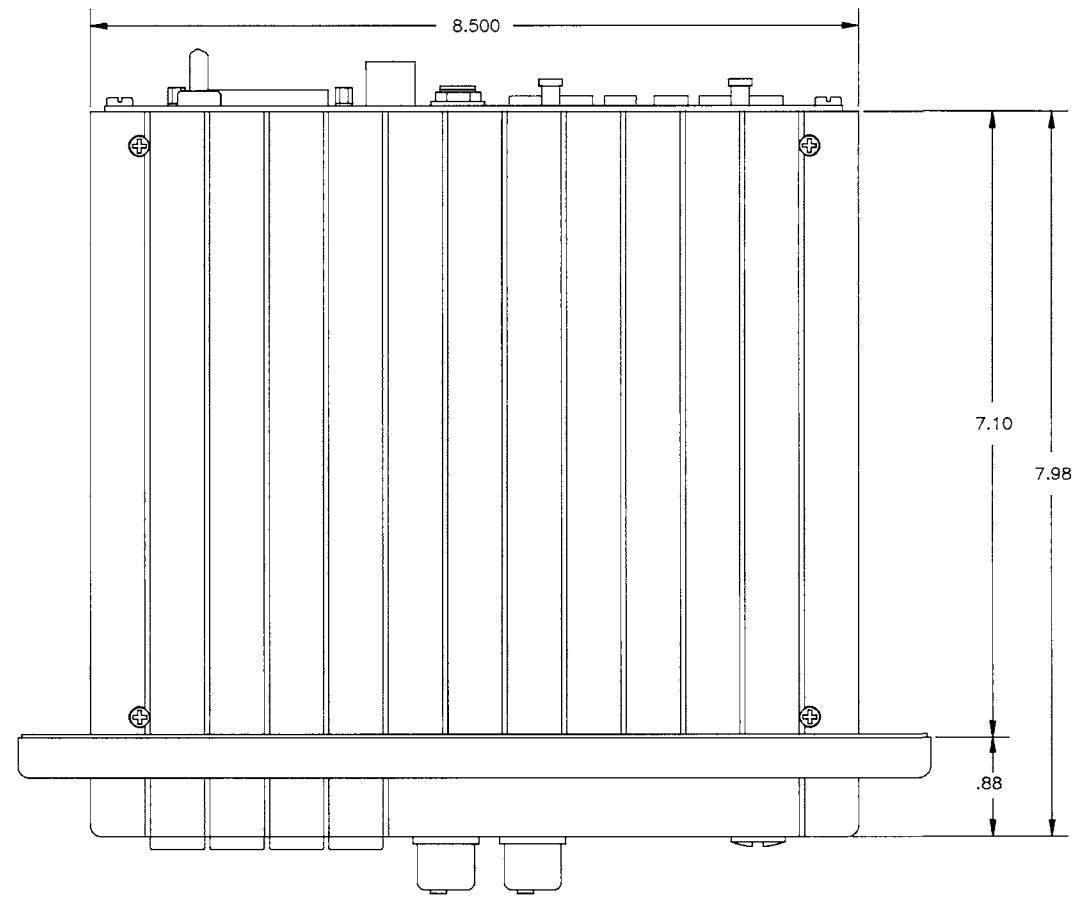
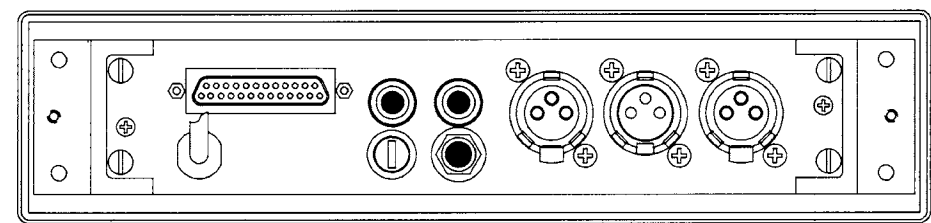
CONTRACT NO.	
APPROVALS	DATE
DRAWN R.NEILSON	10/11/89
CHECKED G.M.	10/12/89
ISSUED	

RTS SYSTEMS		BURBANK, CALIFORNIA, USA	
OUTLINE DRAWING— RACK MOUNT, MCE325 PROGRAMMABLE USER STATION			
SIZE D160572	FSCM NO.	DWG NO. OD6355	REV A
SCALE 1/1	O6355A02.DWG	SHEET 2 OF 4	



UNLESS OTHERWISE SPECIFIED REMOVE ALL BURRS & BREAK SHARP EDGES HOLE TOLERANCES PER ANSI B94.11-1987, R1972 DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ±1/16 .XX ±.030 ±0.30° .0004-.010		CONTRACT NO.		RTS SYSTEMS BURBANK, CALIFORNIA, USA	
APPROVALS		DATE		OUTLINE DRAWING— MCE325 PROGRAMMABLE USER STATION MCS325 MODULAR LOUDSPEAKER TABLETOP OPTION	
DRAWN R.NEILSON		10/11/89		CHECKED G.M.	
ISSUED		10/12/89		SIZE FSCM NO. DWG NO. REV D160572 OD6355 A	
NEXT ASSY	USED ON	FINISH		SCALE 1/1 06355A03.DWG SHEET 3 OF 4	

REVISIONS			
ZONE	REV	DESCRIPTION	DATE
		SEE SHEET ONE	

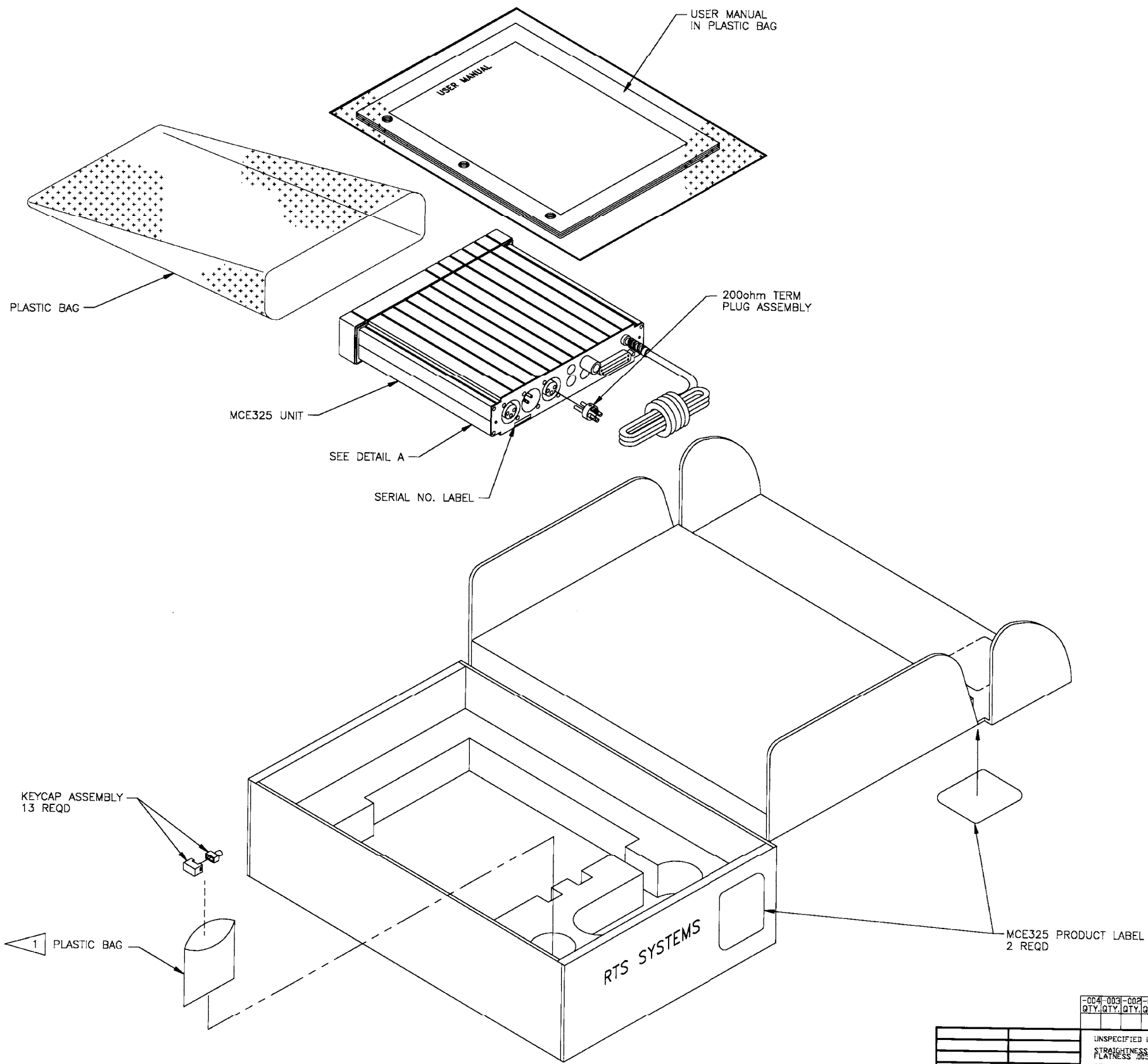


UNLESS OTHERWISE SPECIFIED
 REMOVE ALL BURRS & BREAK SHARP EDGES
 HOLE TOLERANCES: FID
 ANSI B94.11-1987, R1972
 DIMENSIONS ARE IN INCHES
 TOLERANCES ARE:
 FRACTIONS ±1/16
 DECIMALS .X ±.080
 .XX ±.030
 .XXX ±.010
 ANGLES ±0.30°

CONTRACT NO.		RTS SYSTEMS		BURBANK, CALIFORNIA, USA	
APPROVALS	DATE	OUTLINE DRAWING— MCE325 PROGRAMMABLE USER STATION CONSOLE MOUNT OPTION			
DRAWN	10/11/89				
CHECKED	10/12/89				
ISSUED		SIZE	FSCM NO.	DWG NO.	REV
		D160572		OD6355	A
NEXT ASSY	USED ON	SCALE	1/1	O6355A04.DWG	SHEET 4 OF 4
APPLICATION					

NOTES:

SHEET		SHEET		REVISIONS							
REV.	REV.	REV.	STATUS	LOC.	REV.	DESCRIPTION	ECO. NO.	DRF	CHKR	APP	DATE
		A				REVISED PARTS LIST NO.	3238	RTC			10/15/90
		B				EXTENSIVE CHANGES SEE ECO	60605	DS			
		C				DELETE DETAIL A	61255	JC	JC	-	12-5-95



1 FOLD AND STAPLE BAG AFTER INSERTING KEYCAPS.

NOTES: UNLESS OTHERWISE SPECIFIED

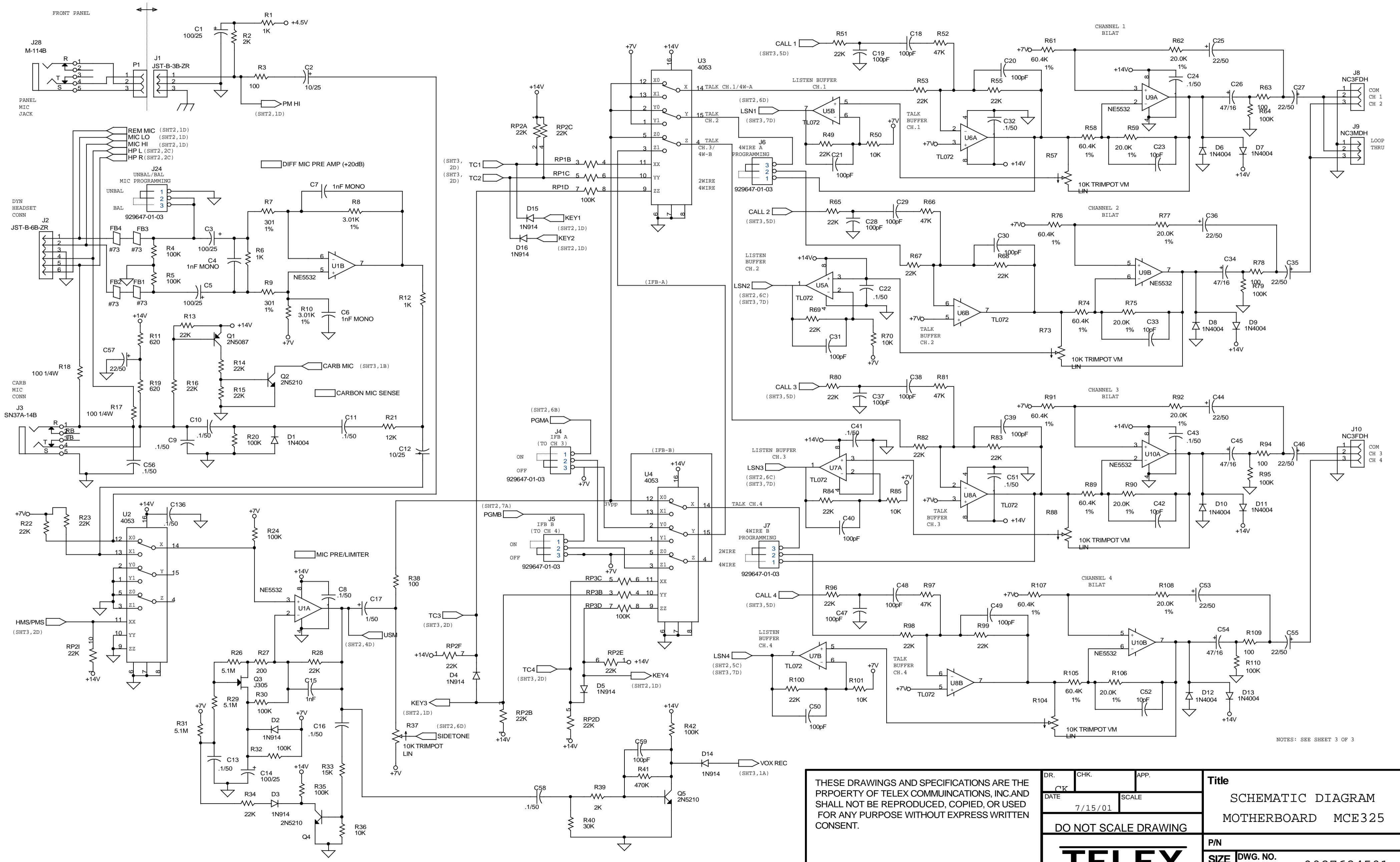
A/CAD GENERATED DRAWING
 FILE NAME: D:\90006464\000\C\SH11

QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	REV.	REF. DESIG.	PART NUMBER	DESCRIPTION

UNSPECIFIED LIMITS OF TOLERANCE	DECIMAL
STRAIGHTNESS AND/OR FLATNESS .005 IN/1 IN.	.X ±.050 IN.
CIRCULARITY .010 TIR	.XX ±.030 IN.
ANGLES ±1/2° BENDS ±2°	.XXX ±.010 IN.
UNMARKED ANGLES, BENDS AND INTERSECTIONS 90°	
THREADS- EXT. CLASS 2A INT. CLASS 2B	MACHINED FINISH 64
MOLD FINISH SPI-SPE NO. 3	DRAFT 2°

DR DS	CK	APP	TITLE
DATE 6/6/95	SCALE NONE		PACKAGING DRAWING MODEL MCE325
DO NOT SCALE DRAWING			P/N
TELEX			SIZE DWG. NO. 90006464-000
MINNEAPOLIS, MINNESOTA			SHT. 1 OF 1
			PLANT DIST. B.E.

REVISIONS						
LOC	REV	DESCRIPTION	ECO. NO.	DRFT	CHKR	APP. DATE
	A	RELEASE TO FACTORY	7.3.5.2.1		CK	12/7/00



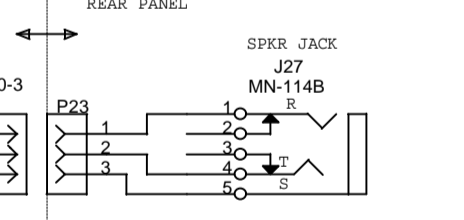
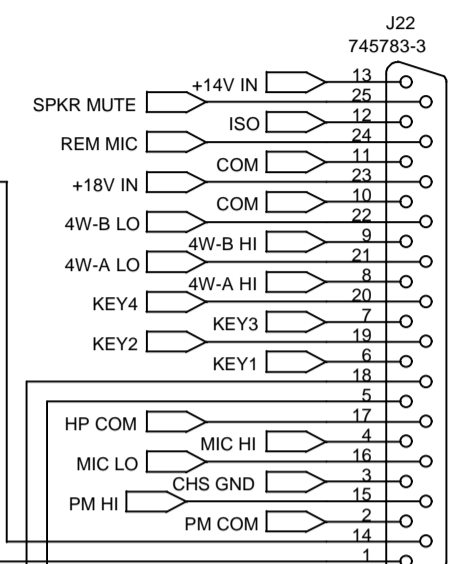
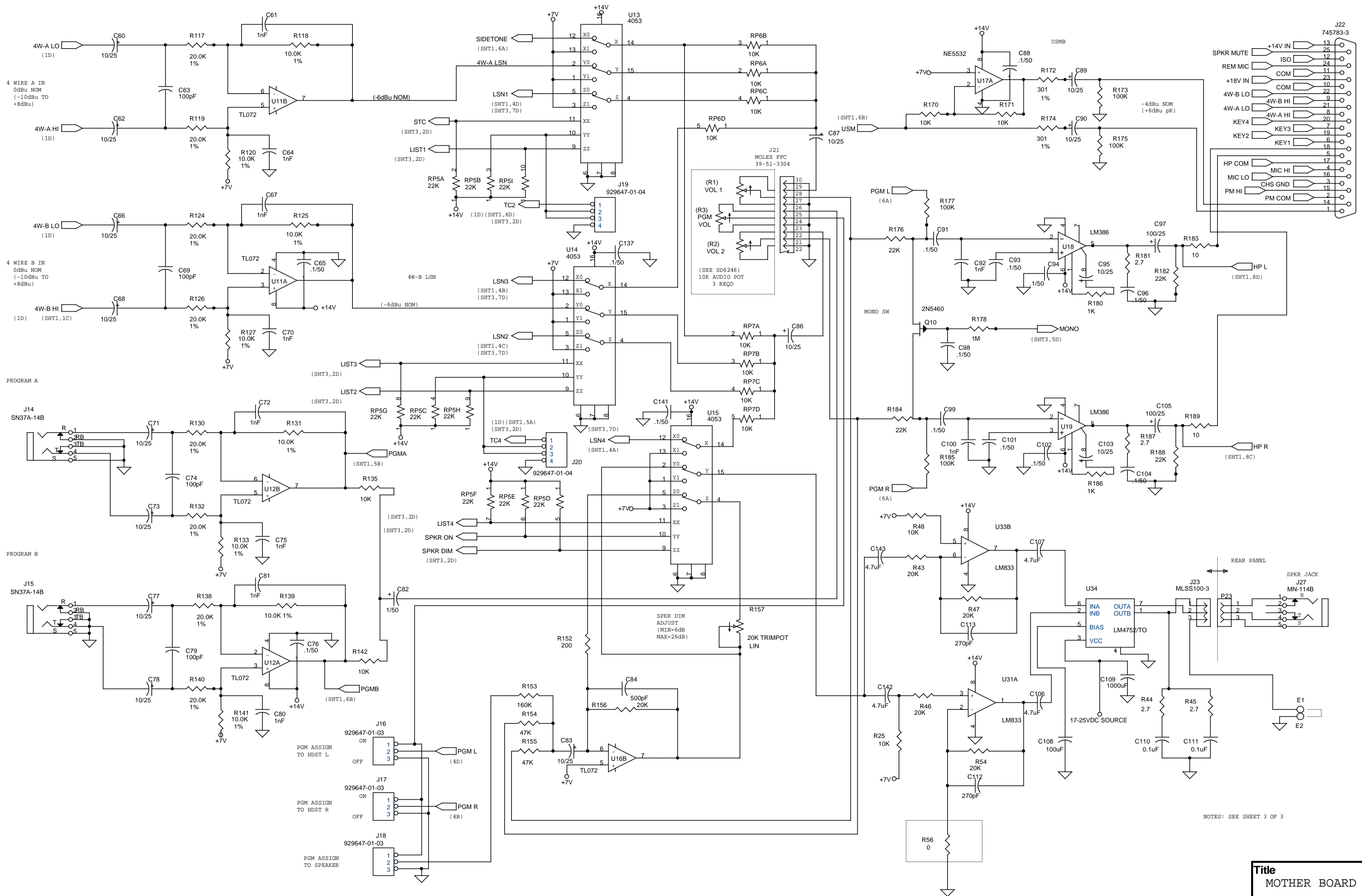
NOTES: SEE SHEET 3 OF 3

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DR. CK	CHK.	APP.
DATE	7/15/01	SCALE
DO NOT SCALE DRAWING		
TELEX COMMUNICATIONS, INC.		
BURNSVILLE, MINNESOTA		

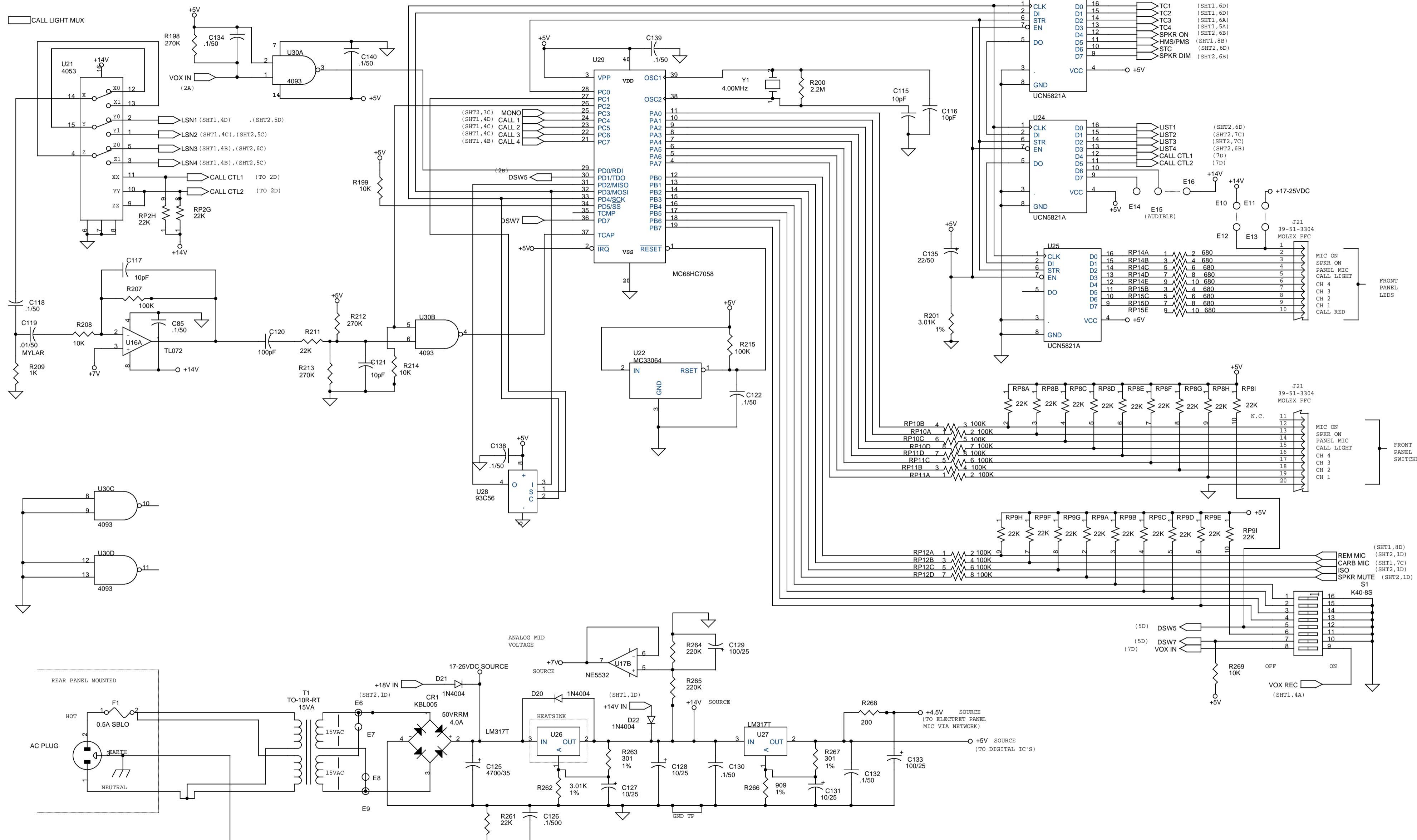
Title	
SCHEMATIC DIAGRAM	
MOTHERBOARD MCE325	
P/N	
SIZE	DWG. NO. 9027624501
D	Sheet 1 of 3
PLANT DIST:	B.E.

ORCAD GENERATED DRAWING
FILE NAME: J/IC_GROUP/ECAD/SCHEMATIC/6245



NOTES: SEE SHEET 3 OF 3

Title	MOTHER BOARD MCE325	PAGE	2
DWG. NO.	9027624501	REV	A

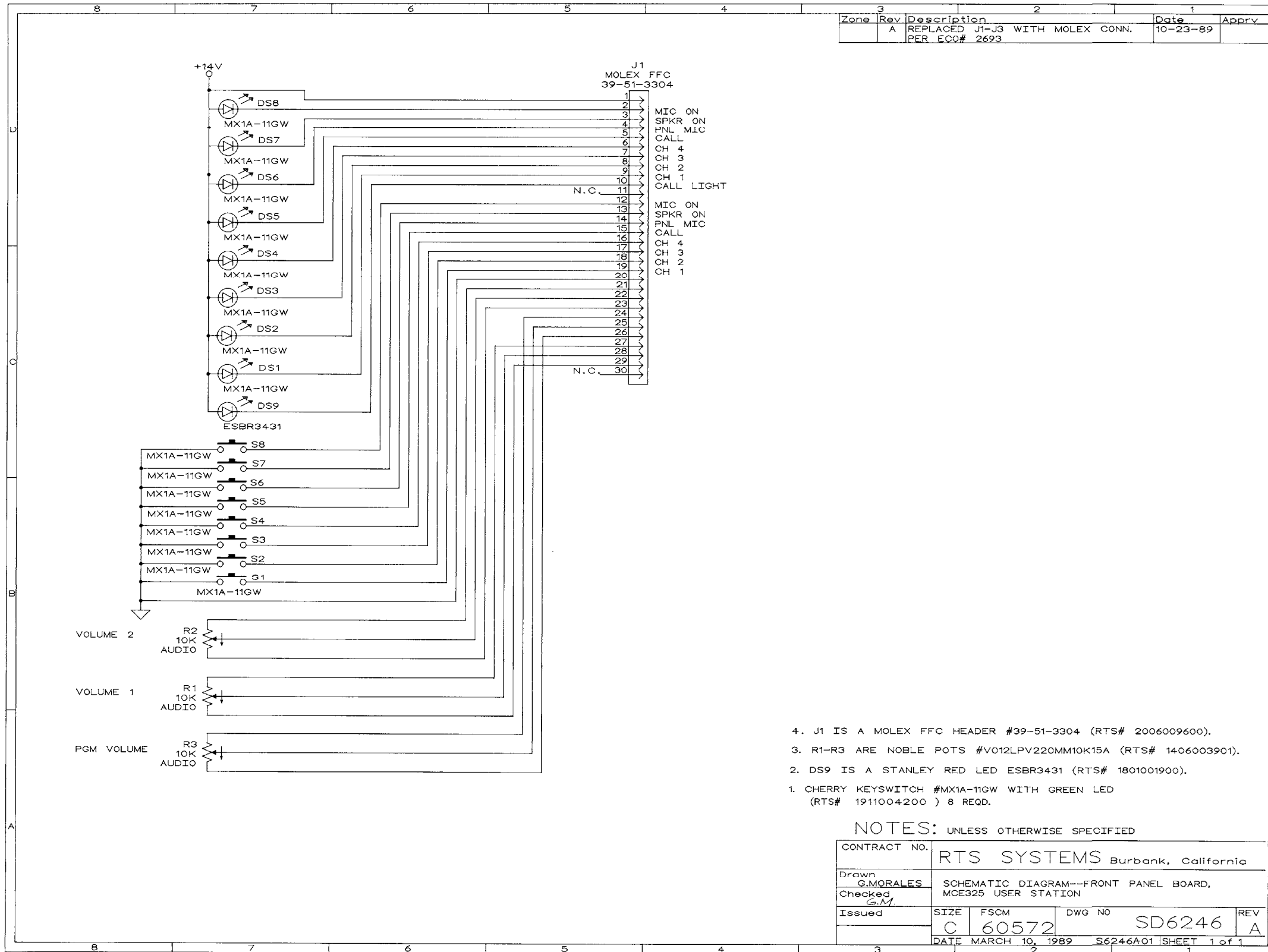


2. CAPACITANCE VALUES ARE SHOWN IN MICROFARADS/VOLTS.
 1. ALL RESISTORS ARE CARBON FILM, 1/8W, 5%.

NOTES: UNLESS OTHERWISE SPECIFIED

Title	PAGE
MOTHER BOARD MCE325	3
DWG. NO.	REV
9027624501	A

SD 6246 1051
 SCHEM - FRONT PNL BOARD MCE325 USER STATION



4. J1 IS A MOLEX FFC HEADER #39-51-3304 (RTS# 2006009600).
3. R1-R3 ARE NOBLE POTS #V012LPV220MM10K15A (RTS# 1406003901).
2. DS9 IS A STANLEY RED LED ESR3431 (RTS# 1801001900).
1. CHERRY KEYSWITCH #MX1A-11GW WITH GREEN LED (RTS# 1911004200) 8 REQD.

NOTES: UNLESS OTHERWISE SPECIFIED

CONTRACT NO.		RTS SYSTEMS Burbank, California	
Drawn	G.MORALES	SCHEMATIC DIAGRAM--FRONT PANEL BOARD, MCE325 USER STATION	
Checked	G.M.		
Issued		SIZE	FSCM
		C	60572
		DWG NO	SD6246
		REV	A
DATE MARCH 10, 1989		S6246A01 SHEET 1 of 1	